THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

VOL. XIX. No. 470—22ND YEAR.] LONDON, OCTOBER 11, 1870. [Subscription { 12s. in Advance. / 18s. Credit. per Annum.] DOUBLE No. Price 1s.

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10,000 cubic feet of gas per ton of coal.
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These Meters are warranted to measure correctly and not to vary, and have come into general use more rapidly than any Meters hitherto manufactured.

PARIS EXHIBITION, 1867.
THE TESTING-HOUSE REPORTS.
The Reports prepared for the Science and Art Department, under the direction of the Lords of the Council, detail the arrangements made for testing the gas apparatus exhibited. In the testing-house erected by the Special Committee appointed to further this object a gasholder was constructed by Mr. G. Glover, being a *fac simile* of that produced and patented by him in 1860, and deposited in the Exchequer, under the provisions of the Sales of Gas Act, and British manufacturers of gas apparatus were invited by advertisement, and by direct application, to forward worthy objects for exhibition. Mr. G. Glover was, however, the only manufacturer who sent Meters to be tested. The report states that, as "Mr. Glover is a manufacturer of Dry Meters only, no opportunity presented itself of comparing their accuracy with that of Wet Meters under various circumstances, but the perfection to which that maker has brought his Meters prevents the possibility of those extravagant errors which are well known to exist where Wet Meters are used."
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ALMA WORKS,
WALSALL, STAFFORDSHIRE;
and 69, UPPER THAMES STREET, LONDON,
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HAVE OBTAINED THE
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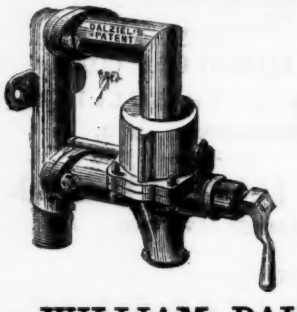

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IMPROVED WET METERS IN CAST-IRON CASES.

STATION-METERS, GOVERNORS, EXPERIMENTING METERS, PHOTOMETERS, PRESSURE-GAUGES, &c.

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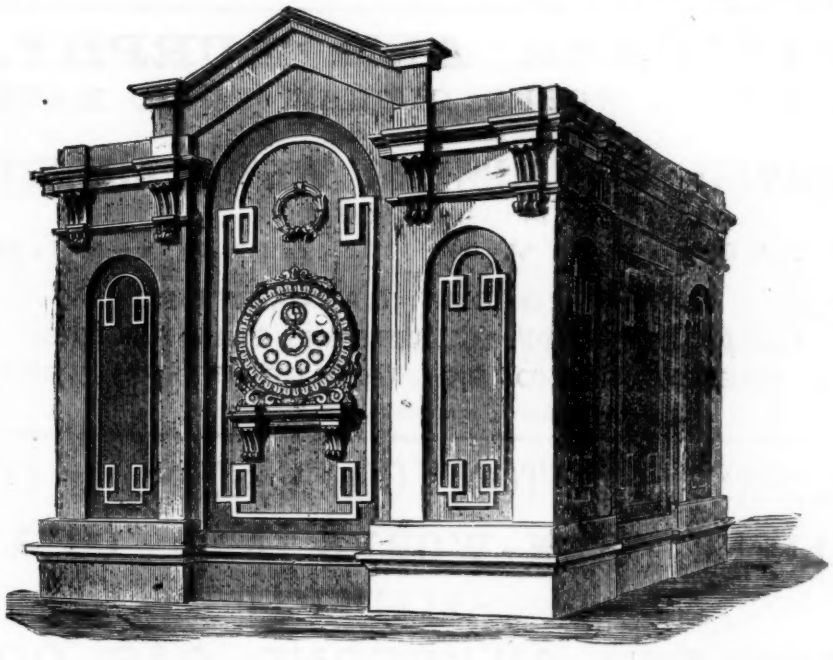
DESIGN FOR STATION-METERS.

From 45,000 to 120,000 Cubic Feet per Hour.



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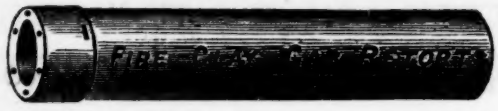

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IN CAST-IRON CASES,

THE UNVARYING WATER-LINE GAS-METER,

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IMPROVED DRY GAS-METERS;

STATION-METERS OF ALL SIZES, with PLANED JOINTS;

GOVERNORS, PRESSURE AND EXHAUST REGISTERS, TEST HOLDERS,

And all kinds of Experimental Gas Apparatus.

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THORNCLIFFE IRON-WORKS AND COLLIERIES,

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CELEBRATED SILKSTONE GAS COALS.

Analyses by F. J. EVANS, Esq., Chartered Gas Company, Horseferry Road, Westminster:—

(COPY.)

Description.	Cubic Feet of Gas per Ton of Coals.	Illuminating Power in Candles.	Coke per Ton of Coal used. Cwt.	Ash in Coke per Cent.	Sulphur in Coal per Cent.
Best Silkstone . .	10,900	17·0	12·8	2·6	1·7
Norfolk Silkstone . .	11,000	15·94	12·5	4·4	1·64
Silkstone Brights . .	11,500	14·5	12·6	7·4	1·85
Silkstone Nuts . .	10,800	15·85	12·66	6·0	0·69

NOTE.—The illuminating power of the Gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.

Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.

OFFICES, 34, LONDON WALL, CITY, E.C.

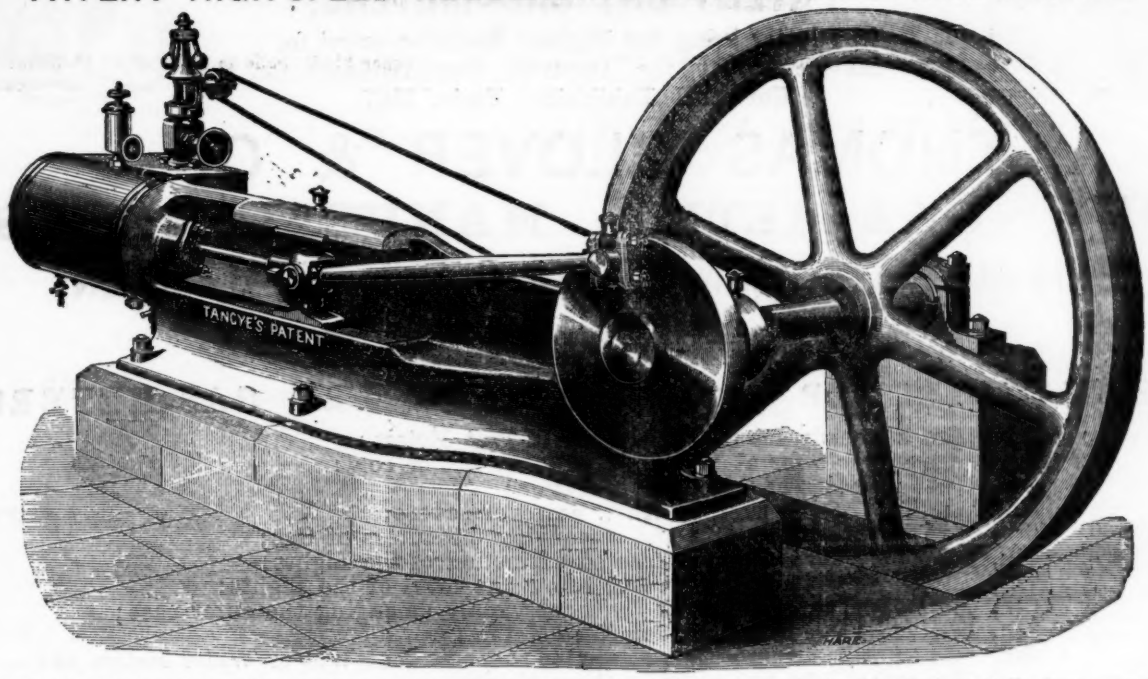
TANGYE BROTHERS & HOLMAN,

10, LAURENCE POUNTNEY LANE, LONDON, E.C.;

And BIRMINGHAM (TANGYE BROS.), CORNWALL WORKS, SOHO.

TANGYE'S

PATENT HIGH-SPEED REGULATING GOVERNOR STEAM-ENGINE.



In this Engine the working parts are considerably reduced in number as compared with Horizontal Engines generally, rendering it far more durable and compact. The bed-plate, front cylinder cover, guides, and plummer-block for crank-shaft bearing are formed of one piece of metal, which in design and proportions is admitted by competent engineers to be perfect, and to afford a strength and rigidity that cannot possibly be attained with the best-fitted Engines of the ordinary horizontal type. The crosshead blocks and all the bearings are adjustable, so that any wear can be readily taken up. The material and workmanship are of the highest class throughout.

The Governor is of a very special description, and combines in the small space usually occupied by the ordinary Steam Stop-valve, a Governor, Throttle-valve, and Stop-valve complete. It is exceedingly sensitive, simple, and compact.

PRICES AND PARTICULARS.

NOMINAL HORSE POWER	ONE	TWO	THREE	FOUR	SIX	EIGHT	TEN	TWELVE
Diameter of Steam Cylinder	3 in.	4 in.	5 in.	6 in.	8 in.	9 in.	10 in.	12 in.
Length of Stroke	6 in.	8 in.	10 in.	12 in.	16 in.	18 in.	20 in.	24 in.
Price of Engine, with Governor and Feed Pump	£20	£27 10	£35	£45	£60	£80	£100	£120
Price of Engine and Boiler, with Fittings	£43	£56 0	£84	£100	£135	£168	£205	£235

THE "SPECIAL" STEAM-PUMP.

NOTE.

Each one is carefully tested with Steam and Water before leaving the Manufactory.

In case of special quotations, the following particulars are required, viz.—

Pressure of Steam in Boiler.

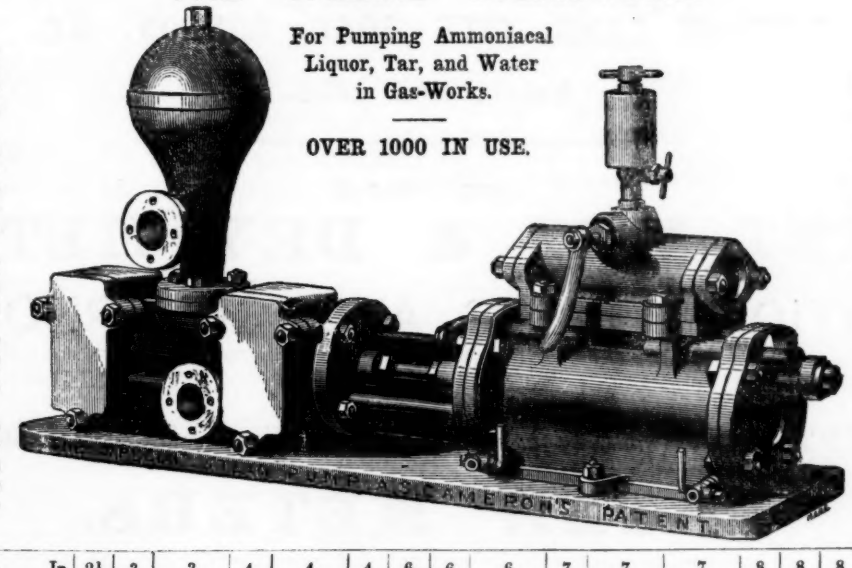
The number of gallons required to be lifted in a given time.

And the height of Lift from level of water to the point of delivery.

In ordering, state the purpose for which the Pump is required, to ensure suitable valves being sent.

For Pumping Ammoniacal Liquor, Tar, and Water in Gas-Works.

OVER 1000 IN USE.



NOTE.

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All Double Acting.

Works at any Speed, and any pressure of steam.

Will force to any height.

Delivers a constant stream.

Can be placed at any distance away from a boiler.

Occupies little space.

Simple, Durable, Economical.

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Diameter of Water Cylinder	In.	1¼	1½	3	2	3	4	3	4	6	5	6	7	4	6	7	8	6	7	8
PRICE		£10	£15	£22 10	£20	£27 10	£35	£30	£40	£47 10	£50	£52 10	£57 10	£50	£55	£65	£85	£70	£80	£100

London, 1851. New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867.

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DRY GAS-METER MANUFACTURERS,

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THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS,

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON & CO.,

(SUCCESSORS TO SAMUEL CROSLEY,)

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Established 1816.

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STATION-METERS AND GOVERNORS,

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EXPERIMENTAL METERS, PHOTOMETERS, GASHOLDERS, &c., &c.

WATER METERS.

W. P. & Co. beg to state that they are now prepared to supply Station-Meters with planed joints.

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No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

NOTICES.

The subscription to the JOURNAL is 15s. per annum, if paid in advance during the month of January, or 18s. credit, in two sums of 9s. each, in July and January of each year. Post-Office orders should be made payable at the Money-Order Office, London, to William B. King, 11, Bolt Court, Fleet Street, by whom the business department of the JOURNAL is conducted.

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All communications for the Editor to be addressed, "No. 42, Parliament Street, Westminster;" and all remittances for subscriptions or orders for advertisements to the Publisher, No. 11, Bolt Court, Fleet Street.

THE JOURNAL OF GAS LIGHTING, WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, OCTOBER 11, 1870.

Notes upon Passing Events.

THE story that Mr. Bruce suggested Mr. Ayrton as a proper successor to Sir John Thwaites, and that he hinted at the possibility of the Board being continued, if the Government were relieved of the troublesome First Commissioner of Works, turns out to be a mare's-nest, much to the vexation of the finder, Mr. Shaw, who will evidently go on believing it to the day of his death. We have not the least doubt that the Cabinet would willingly send Mr. Ayrton to the Metropolitan Board, the Coventry Islands, or any other distant and salubrious region, to put colonial affairs in perfect order, and snub all the colonial officials and colonists, if Mr. Ayrton would only go, and if the colonists would only receive him. But Mr. Ayrton knows his disagreeable powers too well to sell himself cheaply. To be perpetual Prefect of London at £2000 a year, living in a suitable mansion, with the natural patronage, and the power of insulting at least one deputation every week in the session, besides bullying the other members of the council, might tempt Mr. Ayrton, if it *were* likely to be perpetual. But no new, and few old institutions can be guaranteed to be for life in these revolutionary times. Mr. Ayrton was once a Radical Reformer. We dare say the remains of the Reform League that meet in Hyde Park and Trafalgar Square look upon him now as an *aristo* of the blackest character.

The governorship of Tasmania has before now been a stepping-stone to the government of New South Wales and Madras. Tasmania is likely to be vacant. The country gentleman who accepted it—to the amazement of his friends, who could not conceive existence where there were neither fox hounds, nor pheasant battues, nor quarter sessions—because he thought his estimable father would live to be 100, has lately lost this admirable but too patriarchal parent at 90 years. Tasmania has a delightful climate. The colonists are not rich enough or numerous enough to be troublesome. There has been a talk both of abolishing the expenses of separate government and annexing the island by telegraph to Victoria, as a sort of highland and rural resort for the rich citizens of Melbourne. While such a pleasant gentleman as Mr. Dupré remains governor, the amalgamation will not make much way, but a twelvemonth with Mr. Ayrton would give enormous strength to the union party.

In this discussion we have rather lost sight of the Metropolitan Board, which is now in all the agonies of uncertainty.

To be, or not to be—that is the question.

As we have before observed, the greatest hope of prolonging its existence against the rivalry of future Lord Mayors lies in electing as chairman a man of mark. Mr. Ayrton being out of the question, Sir William Tite seems by far the most proper man, if he will take upon himself the onerous task of ruling over Bumbledom. He is an accomplished architect, out of business, in the enjoyment of an independent fortune, a member of Parliament, and lately created Companion of the Bath—the red riband would grace the rare festivities of the Board of Works. Sir William is a thorough man of business, who would neither allow architects and builders to talk nonsense to him, nor needlessly and fussily interfere with the professional officers of the Board. Mr. Lowman Taylor has been talked of. He is a man more feared than loved; but would he like to put himself in competition with the Lord Mayor and Common Council of London? Under the new municipal government of the metropolis, there will not be room for two kings of Brentford. But perhaps an arrangement by which one permanent officer should preside over works, and another over pomp, pageantry, and hospitality, would work well. However, peace seems probable, and the world of London must wait to see what the vacation, if not the leisure, of the incubating members of Parliament will bring forth. Mr. Bruce has not been lucky in his legislation; but if he can obtain the assistance of Mr. Göschen and Mr. Forster, something practical may be expected.

Mr. Francis Fuller is a lucky man. He has managed once more, after a life of failures, to get himself talked about for a few days, and even to be the subject of a leader in the *Times*. Mr. Fuller is an excellent auctioneer, and may say with the milkmaid, "My face is my fortune." Many a bidder has been tempted on to expensive enthusiasm by the hammer so gracefully waved by the owner of the fresh, pleasant countenance, smiling above his blue tie. He had also, in the good old railway times, acquired a certain reputation as a land buyer for such companies as the London, Chatham, and Dover, the Brighton and South Coast—both now insolvent. Mr. Fuller has been deeply concerned in one or two big building estates—Caterham, for instance, honoured by the *pied-à-terre* of the Chancellor of the Exchequer. Caterham has not been a good investment for Mr. Fuller's client, in spite of the railway created to develop its building resources. But the achievement on which Mr. Fuller particularly prides himself, and to which he always brings in an allusion—sometimes by the head and shoulders—is the transfer of the Crystal Palace from Hyde Park to Sydenham. Mr. Fuller was the managing director at the salary of a Secretary of State, when the genius of Paxton, the science of Charles Fox, the fancy of Owen Jones and Digby Wyatt, were exhausted to produce the palace and pleasure-grounds which Mr. E. T. Smith and Mr. Nelson Lee have made so attractive to Foresters and Oddfellows without producing a dividend. The Crystal Palace is a charming place, but never paid any one, except the contractors for the building and the managing director. It is not a palace for the people any more than Covent Garden Theatre, because the *populus* have *not* eighteenpence a head for amusement, and it is not a museum of high art; if it were, puppet shows would not be required to enhance its attractions. The people, when they want gardens, go to the Parks or Kew, open "free gratis;" and for music they flock in thousands to Islington, and hear the "Messiah" for twopence, while they drink their beer or tea, according to taste. The Crystal Palace is a middle-class luxury. Why do we refer to these things? Because Mr.

Fuller has set himself up as a preacher and teacher, to instruct in the way of abolishing pauperism and cultivating all our waste lands. Mr. Fuller has put his name to several pamphlets on different subjects, all in different styles; so that, if he writes them himself, his form of expression must be as varied as his knowledge. This last deals in the wildest figures on the number of paupers and the acres of land.

Mr. Bailey Denton, a very different man, not nearly so charming and discursive—but then he writes his pamphlets in his own crabbed style, and knows perfectly well what he is writing about—has shown how necessary it is, and how comparatively easy it is, if Londoners and farmers will do their duty, to put agricultural labourers in good cottages with good gardens, helped by allotment ground. But when we come to analyze the pauperism of England, although we find many districts in which labourers are not in the independent and hopeful condition they ought to be, able-bodied labourers out of work are not to be found. The destitute paupers are composed of the aged, the imbecile, the chronically sick, besides widows with families of children of tender age. The destitute in any considerable numbers are to be found in towns—men out of work, who have come to towns to seek it and not found it; men who have work in fine weather and not in wet; men who are dependent on great building operations at a standstill, or railway work completed or discontinued; and men who have failed at higher employments. Sift them as Mr. Göschen sifted them in his speech on the subject in the last session, and how many will you find able and willing to do a day's work worth eighteenpence on a wild moor of intractable soil? For more than ninety years the work of reclaiming wild land in England and Scotland has been carried out with the vigour stimulated by an extraordinary demand. Millions of acres have been reclaimed in Norfolk, Lincolnshire, and Yorkshire, that are even now only kept in cultivation by an expenditure in live stock to make manure, in imported food of cake and corn to feed the live stock, in artificial manure to grow the roots, that makes the winter keep of sheep and cattle amount to double and treble the rent; in fact, every year, a value equal to another fee simple is put in, to be recovered in the shape of grain, beef, and mutton, on an average of three years! As such is the case, it does not require any elaborate argument to prove that "the pick of the basket" has been taken long since. It is only in rare instances, and comparatively small plots, that land is to be found capable of arable cultivation at a profit. There are, it is true, vast tracts of wild land on Dartmoor and Exmoor, the greater part in the hands of private persons. A quarter of a million of money was invested and lost on twenty thousand acres of Exmoor, in an endeavour to rival the agricultural triumphs of Coke in West Norfolk, and Lord Yarborough on the wolds of Lincolnshire. In the climate of Norfolk and Lincolnshire, rabbit warrens, at two shillings an acre rent, were turned into arable land worth twenty shillings an acre and more On Exmoor, no corn ripened; making good hay was a lucky chance. A population of cotters, condemned to live out of the produce of Exmoor, must have starved. What an enterprising cultivator could lose, we have stated. On Dartmoor, convict labour produces no encouraging results. There is very little uncultivated land in England or Scotland more favourable for arable cultivation—the only cultivation possible under hand labour—than Dartmoor and Exmoor, or much that is exposed to a more inclement climate. These questions are altogether questions of figures. Let the projector who proposes to increase our corn supply, by even one million quarters, state for what district he desires to commence with 20,000 acres, with how much capital, with how many unskilled labourers, at what wages, and in how many years he expects to obtain a profitable crop. In Scotland, where a few half-starved cattle roamed in the days of Rob Roy, thousands of a superior breed of sheep are reared, and even fattened, with a certain number of the finest bullocks. They occupy ground under a climate where a population once lived in a state of chronic starvation. Such essays as Mr. Fuller's divert the attention of the educated, ignorant of the history of agriculture, from really practical reforms—in the laws of land transfer, in the regulations of parish roads and the sanitary arrangements of villages, and the claims of agricultural labourers to possible independence.

When the new scheme for supplying Paris with water was settled, it was pointed out that it might be cut off by any enemy advancing across Champagne. No Frenchman would admit the possibility of such a misfortune. Now it is done, we hear that old sealed-up wells are to be opened. Paris, if the siege goes hot, will be able to afford experiences on the effects of bad water and no milk.

Lord Overstone is a man of remarkable natural powers highly cultivated; he is also the possessor of several millions of money, and, from his wealth and his acrid cleverness, not the sort of person often contradicted. Having never been a Cabinet Minister or a Member of Parliament, and having been a great banker until he condescended to be a peer, he has always had his own way, right or wrong. Colonel Lloyd Lindsay, Lord Overstone's son-in-law, is a very brave man—he won the Victoria Cross in the Crimea—whether he is clever we do not know. We do know that he objects very much to be taught anything he does not, or to admit that he has even been the victim of misplaced confidence. Lord Overstone and Colonel Lloyd Lindsay have brought money and all the enormous weight of their financial and aristocratic influence to bear in establishing the St. Martin's Lane Society for Relieving the Sick and Wounded in the War. Some of the same names appear at the same place as the committee of the Belgian entertainment, which was a wonderful muddle, carried off on the shoulders of a brilliant ball. Colonel Lloyd Lindsay's committee have raised, it is said, over a quarter of a million, but their management seems to be by no means beyond criticism. It is said, in the correspondence of the *Times*, that not more than fifty thousand pounds of the money subscribed has been expended, although the committee have only to ask and to have. To keep a large reserve-fund is the mischievous mania of all wealthy societies. They are apt to be managed on banking principles. If this be so, and the statement in the *Times* has not been contradicted, there will be a large sum at the end of the war—a temptation to mismanagement, if not jobbery. But Sir George John Sinclair, the descendant of a generation of busy-bodies, who has visited all the ambulances and hospitals at the seat of war, goes into details which show that many of the mistakes, of what we may call philanthropic positivists, have been committed for want of the advice and assistance of practical men. For instance, a large quantity of stores have been placed under the charge of one person, who describes himself in a letter to the *Times*, defending his committee by admitting all the charges, as the unpaid storekeeper of the society. No single man could do such a job, and an unpaid storekeeper is about as sensible an arrangement as an unpaid managing clerk. A society with a quarter of a million of money cannot lay a small part of it out better than by engaging paid practical, competent, servants to do work under the orders of unpaid directors like Captain Brackenbury. Only think of economizing by employing an unpaid carpenter or blacksmith!

Sir J. G. T. Sinclair is not a young man, but he appears very innocent of the ways of charitable societies when he makes the following recommendations:—

> The German Governments place almost unlimited confidence in these Johanniter, who wear a uniform and cross, and a certain number are attached to each *corps d'armée*, which is complete in itself. The Johanniter can always obtain the use of the railway waggons, carriages, post, and telegraph, free of expense; they can obtain supplies and horse transport by requisition at fair prices, instead of at the fancy prices extorted from our society; they work in concert with the military medical authorities; and they are aided by intelligent and practical men of business, who have volunteered in large numbers for the purpose. This system, though it may be open to some objections, is on the whole admirable, and that the proper course for the National Society would be to send out an intelligent English gentleman, without salary, like one of the almoners of the Society for the Relief of Distress in London, aided perhaps by an intelligent clerk, to act in concert with the Johanniter in command at each German *corps d'armée*. He should have cash or credit to an adequate amount, but no stores, excepting such articles *as can be bought cheaper and better in London, or are given gratuitously*. By concert with the Johanniter and his numerous and effective staff, the wants of the sick and wounded would be known from day to day, or even from hour to hour, and each English agent could have frequent intercourse with the other English agents and with the *corps d'armée* for mutual advice and assistance, while he could communicate regularly, rapidly, and easily with the London committee, while correspondence *viâ* Arlon is rare, tedious, and intermittent.
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> As matters now stand, we are likely to send, too late, abundance of stores which the Germans do not want, and which could usually be bought by them far cheaper, quicker, and better, while they will not receive in time a sufficiency of those things which they do want; and however munificent the English subscriptions are in money and in kind (the committee apparently not having taken the trouble approximatively to value the latter, which is much to be regretted), the Germans will only remember receiving too late, sometimes in inadequate doles, and at other times in overpowering profusion, a lot of comparatively useless stores, which have been bought and transported at usurious rates, many of which will probably have to be sold at the end of the war for an old song.

Such a system would not satisfy fussy committee men—would give nothing to order, and less to do at home. Besides, the St. Martin's Lane committee had their plea, and were not to be taught or talked to by any one—even a baronet and M.P., who passed for wharfingers clerk. In the same style is Dr. Thuddichum's announcement that he meant to found a *model* hospital at Bingen, on the Rhine. War is not a time for model work; it would be just as wise to boast that a French cook of renown had been sent to improve on the soldiers rations. Let subscribers to the St. Martin's Lane fund, if they dare, insist that the money be spent through every sound agency, not hoarded to keep a respectable balance at the bankers. We once knew a first-class City banker, quite out of the railway world, who protested against raising a loan to open a nearly completed railway at a time when it was most difficult to get the final calls paid. He protested, on principle, against going into debt, although it was to create income out of unproductive property. Such is not an uncommon example of the banking mind. Colonel Lindsay is going to send twelve waggons from England, while equally useful, although not so splendid, articles, could be bought for half, perhaps a quarter,

the cost in Belgium; but then, Colonel Lindsay's waggon friend would not make so much sensation with rough Belgian carts.

In peaceful times we hear a good deal of the superior politeness of the French and other continental nations, and no doubt there is a good deal more external courtesy between working men, as far as taking off hats and embracing goes, but in one important particular certainly neither French nor Germans equal our countrymen in courtesy—that is, in respect and attention paid to educated foreigners. "Foreign surgeons and chiefs of ambu-"lances keep all the operations jealously to themselves; the sur-"geons sent from England at the request of the Prussian Ambas-"sador are only allowed to act as dressers." We have no hesitation in asserting that French or German surgeons sent to assist an English medical department would, as a matter of hospitable courtesy, be allowed the first place in any surgical work.

The Lord Mayor continues to surpass himself in language more plain than polite. On Wednesday last some gentlemen, of whom, with the exception of Mr. Thomas Braithwaite, we never heard before in connexion with science, waited as a deputation on the moribund Lord Mayor to obtain his patronage for a "National University "for Industrial and Technical Teaching." This National University is designed "to provide for the great want of the age by training "natural philosophers, artists, chemists, engineers, and mecha-"nics, who shall carry the light of their genius into every work-"shop in the United Kingdom, and bestow its honours and "rewards on those who shall obtain distinction in arts and "sciences." Wonderfully big words, worthy of a Pistol of scientific quackery. A Dr. Mill introduced the deputation with a report stating "the gradual failure of our English manufactures, "and the increasing superiority of the labour of other nations "over that of British workmen." Lord Mayor Besley is not an educated man, in the scientific sense of the term, and was not, therefore, able to hit the blot of this very absurd scheme for "creating genius;" but he extinguished the deputation by declaring that "if they wished to smash technical education for the "next 25 years, they could not do better than publish Dr. Mill's "report. It bristled with untruths, and entirely destroyed any "confidence people might be inclined to place in the com-"mittee." If Mr. Besley had said half truths, he would not have been far from the mark; but the cause of technical education now occupying the attention of some of the best men in our public schools and universities is not to be snuffed out by the report of an obscure self-elected committee, even if it should obtain the support of the next Lord Mayor. Nothing can be more absurd than the idea of founding a university which, if successful, could not produce any results for twenty years. What we need and what we shall shortly have will be such an education in the schools of our middle classes as will make manufacturers understand the value of scientific training and assistance. At present, most wealthy manufacturers excel only as good salesmen and good managers of labour—qualities essential for success, and not inconsistent with scientific and artistic education. Our working men do not want colleges or universities, and genius is not to be manufactured. They want education enough to value evening schools, where journeymen and apprentices may learn from first-class trained masters, *near their homes*, various branches of art and science, which they may apply to their daily work, and also free access to lending libraries and museums such as are now only found in certain departments of the South Kensington Museum. Our wealthy universities will soon see the necessity of training teachers of natural philosophy, mechanics, drawing, and painting, applied to manufactures. Our workmen are still the first mechanics in the world, only rivalled by the Americans. The opportunities of learning chemistry and the science of mining are rare, and not appreciated from the imperfection of our primary schools. Could not the Institute of Civil Engineers do something to carry out Sir Joseph Whitworth's great and truly practical ideas?

REPORT OF THE MEDICAL OFFICER OF THE PRIVY COUNCIL.

If the health of the people be the highest object of legislation, the medical adviser of the Government is the most important of State functionaries. But the full truth of the maxim, "*Salus "populi suprema lex*," has never been recognized by our Legislature; and the medical department of the Privy Council is still a comparatively unimportant branch of government. It increases, however, in expense, if not in importance; and it is right that the public should know what has been done for the £10,000 or more voted last year for the department. This is told in the report before us, some account of which we propose to lay before our readers.

The contents of the report and its appendix are of a varied character, embracing subjects such as the constitution of the medical profession and the practice of pharmacy, with which it is out of our province to deal; and we need only notice those parts which treat of sanitary matters of general interest. Mr. Simon's report starts with a very brief review of the special diseases of last year, and the means of combating them. One of these special diseases was relapsing fever, of which an outbreak occurred in the metropolis; and the other was scarlatina, which was epidemic over a great part of England. The former still lingers in London, and, as long as extreme poverty continues among a very large class, we can scarcely hope to get rid of it. The latter is, unhappily, still very prevalent, and we can only hope for winter to bring some abatement. As regards preventive measures against the spread of this fatal disease, Mr. Simon seems in despair. "Scarlatina," as he truly says, "is profusely, and to a certain "extent uncontrollably, contagious;" and the only effective preventive measure would be the complete isolation of every one attacked. Such isolation, however, it is impossible to secure, and Mr. Simon laments that what it is quite possible to obtain in the case of cattle disease, and in the interest of cattle keepers, is out of the question when human life and purely human interests are concerned. If scarlatina and the like diseases are to be stopped, "it would be needful, and for the purpose in view would require "to be made a legal obligation, that every health authority of the "kingdom should have sufficient and permanent proper hospital "accommodation for cases of infective disease arising within their "jurisdiction; and should have all disinfectant processes necessary "for protection of the public health done under the direction of a "skilled officer; and should take the initiative in enforcing, as "regards sick persons and dead bodies and infected things, such "several rules of conduct as universal experience dictates, to "prevent the wanton spreading of disease." Failing this, and the rendering of penal such "permitted freedoms" as allow people at their discretion to spread contagion in all sorts of ways, we can only fall back on the hope, faint though it be, that scientific research will in time furnish us with such preventive or counteractive means as will enable us to grapple effectively with a disease which at present seems the most hopeless of all to deal with.

The next section of Mr. Simon's report is devoted to a notice of nuisance jurisdictions and water supplies. During the last year the attention of his department was called to 41 cases, either of actual outbreaks of disease (mostly typhoid or diarrhœa), or of local conditions justifying in somebody's mind the expectation of an outbreak. In 20 of these cases a local inquiry by an inspector was deemed necessary, but the result of only one of the inquiries is contained in the report before us. In the opinion of Mr. Simon, and naturally of all his subordinates, the one essential cause of typhoid and choleraic affections is the excremental poisoning of either air or water, and chiefly of the latter. At the Beddington Asylum, unskilled arrangements admitted sewer air into the house, "and so caused the evil they were in-"tended to avert." At Wicken-Bonant, a "fatally infected" drinking water is alleged to have spread typhoid fever all over the parish; and at Wakefield the inspector found the inhabitants doing much the same as is done in Amsterdam, where it is said the people empty their chamber utensils into the canal with one hand, and dip out their drinking water with the other. How to apportion the relative criminality of air and water as purveyors of infection is extremely difficult. There is probably not one house in a hundred in London into which sewer air does not enter more or less freely; and there is not, perhaps, a private well in the kingdom which is beyond the suspicion of "excremental poison-"ing," if a little nitric acid, and some oxidizable organic matter, be a proof of such contamination. We must leave any one who will take the trouble to read Dr. Buchanan's report to decide for himself how far the parish well at Wicken-Bonant was concerned in distributing typhoid fever in the village. The doctor admits that the disease was imported from London, and that it eventually spread beyond those who drank water from the suspected well; but he nevertheless thinks it sufficiently proved that that well was the immediate cause of the epidemic.

Among the inquiries carried out by the department during the past year was one by Mr. J. Netten Radcliffe, which concerns particularly two, and more or less all the London water companies. Any one who has read the monthly reports of Dr. Frankland, which we regularly publish, will have noticed that the waters of the Southwark and Vauxhall and Lambeth Companies have been often described as "turbid," or "very turbid," and sometimes as containing "live organic forms." This has been held to be evidence that these companies have been acting in habitual contravention of the Metropolis Water Act, 1852, by delivering water without such filtration as the law requires. It was quite proper for the Privy Council to take notice of these reports, and the results of Mr. Radcliffe's inquiries go to prove that in the cases of the two companies mentioned above the subsidence-tanks were too small, and the filtering surface insufficient in extent. This is not much to be wondered at, seeing the constantly increasing demands made on companies supplying rapidly growing districts.

The deficiencies, however, were well known to the companies, and before the inquiry commenced the Southwark Company had taken steps to remedy them. A further charge was made by the inspector that this company was admitting tidal water into the reservoirs at Battersea, but Mr. Simon acquits them of doing this intentionally.

In the case of the Lambeth Company, Mr. Radcliffe considers the source of supply (Kingston Reach) objectionable, inasmuch as the water at that part of the river is peculiarly liable to be made turbid, and he suggests the removal of the intake to Moulsey Reach, with additional provision for subsidence and filtration. It is particularly dwelt upon, and we must call especial attention to the point, that no measures are taken by the Thames water companies, nor apparently any of the others, to ascertain whether filtration is properly carried out by them; and it is suggested that every Thames company should keep a register, showing day by day the state of the filtered water as to transparency, the state of the river, the area of filtering surface in process of being cleansed, the depth of filtering surface removed in cleansing, the state of the exposed surface, the condition of the filter-beds as to freedom of action, and, lastly, the quantity of water supplied in the 24 hours. This suggestion is one which the companies should at once adopt, in view of that more frequent examination of the waters by some official authority, which it is here recommended should be made weekly.

We have expressed an opinion that the inquiry instituted by the Privy Council, at the request of their medical officer, was justifiable and proper; but it is impossible to say the same of the strong terms of condemnation which Mr. Simon applies to the two companies in question, and particularly to the Southwark and Vauxhall Company, whom he charges with "a criminal indiffe-"rence to public safety." "In the case of this company," he says, "not only had there been the long-standing gross insuffi-"ciency of the apparatus of subsidence and filtration—an insuffi-"ciency which at length, under continued pressure from without, "is said to have been for the time amended—but worse, the ad-"ministrators of the supply had from time to time, as they found "it convenient, dispensed to a great extent with even a pretence "of filtration, and during part of the time under review had, "worst of all, either wilfully or negligently distributed, as part of "their supply, the interdicted tidal water of Battersea Reach. "What might have been the result of these malfeasances if cholera "infection had at the time been in London, the reader of my "previous pages can judge. In those pages are stated some "of the dreadful antecedents of this very company, in that same "relation to human life—homicidal antecedents, on a really stu-"pendous scale—antecedents, as to which the company might, no "doubt, urge in extenuation that, till 14 years ago, the injurious-"ness of its then water supply was unproven; but as to which, "since the report of 1856, the damnatory proof has been abso-"lute. And this company, with those antecedents, is now found "the worst offender against the too lenient Act of 1852; experi-"menting again, as though its previous experiment had been in-"conclusive, on the lives of hundreds of thousands of people, "and apparently trusting (but may be with an ill-founded trust) "that the forgetfulness or indifference of public opinion will con-"done also this iniquity."

The "homicidal antecedents" of this company refer, of course, to the alleged distribution of cholera poison by their water in 1854, respecting which Mr. Simon here reprints long extracts from his report presented to Parliament in 1856. It will be remembered that in the two outbreaks of cholera, 1848-9 and 1854, the disease was especially severe on the south side of the Thames, and particularly so in the districts in which the Southwark and Lambeth Companies were competing for customers. In 1854 "their rival "mains were still branching in the same area, often running "parallel in the same streets, and during the epidemic these two "mains were respectively charged with very different waters—the "one taken at Thames Ditton (Lambeth), the other at Battersea; "the latter being described as 'the filthiest stuff ever drunk "by a civilized community.'" A house-to-house inquiry, made at the time, satisfied Mr. Simon that, among the people alleged to be supplied by the Lambeth Company, the deaths from cholera were only at the rate of 37 to every 10,000; while, among those supposed to be supplied by the Southwark, the death-rate was 130 per 10,000. Further, a comparison made in 45 streets through which the mains of the two companies ran parallel, showed that the mortality in equal populations was 57 among the supposed customers of the Lambeth Company, and 164 among those of the Southwark. We quote again: "In some elements of these comparisons there may be "trifling sources of error, but none, I believe, which can modify, "much less vitiate, the general result." One trifling source of error, which certainly goes a long way to vitiate any general conclusion that the water of one company was the special agent in the distribution of cholera, was discovered by the companies subsequent to the outbreak. The mains of the rival companies running side by side through the streets had been tapped indifferently by the service-pipe layers, so that houses were frequently supplied by one company and rated to the other. This occurred not once or twice, but in very numerous instances, so that it was impossible, in a large number of cases, for the inhabitants to know whence they derived their water. This was abundantly proved by the officers of the companies on a revision of the districts, and instances are occasionally found to this day. We may add, that another trifling source of error lay in the ignorance of the inhabitants as to the source of their supply from another cause. The water-rates in the poorer and most infected districts were not paid by the tenants, but by the landlords; thus any statement made by the former must have been a pure guess. We are, therefore, compelled to believe that any statistics of this sort gathered by Mr. Simon are worthless, and all deductions founded upon them open to question. The fact we have mentioned can hardly be unknown to Mr. Simon, and it is obviously unjust to the company now to reproduce a statement founded more or less upon error. He has, however, a theory to insist upon, and for that reason he also reprints a part of Mr. Radcliffe's report on the East London water in relation to the cholera outbreak of 1866. Here, too, we find yet once again that marvellous story of the Theydon Bois outbreak, of which it is sufficient to say that any one who accepts that as a proof of the dissemination of cholera poison by water must either be wilfully blinded by prejudice or inaccessible to reason. The case abundantly proves the infectiousness of cholera, but it is absurd to suppose that a well, however polluted, could communicate cholera to four people who never partook of water from it.

We are not without warnings that in the next year the metropolis may again be visited with Asiatic cholera. We must, therefore, put the companies on their guard, for, most certainly, should the disease affect one district more than another, the company supplying it with water will be accused of distributing the virus. What they can do to keep out a poison which, against some of the laws of nature, will travel up a stream against a current (as must have happened for the East London water to have become polluted with a cholera stool), which is so subtle that the most perfect filtration will scarcely keep it back, and which possesses such extraordinary powers of self-multiplication, we do not know. But we can advise the companies to use every care in fulfilling their acknowledged obligations to the public, to register faithfully the observations here suggested, and to patiently abide the event. We have no desire to see another visitation of cholera, but it might teach us something worth knowing. The misfortune is that when men once commit themselves to a theory, candid observation ceases, and every fact is twisted to make it support the favoured hypothesis.

There are two reports on certain means of preventing excrement nuisances in towns and villages—one on the dry earth system, and the other on the midden system adopted in various northern towns—which possess considerable interest, both from a sanitary and a commercial point of view; but a notice of these we are compelled to defer.

Circular to Gas Companies.

We must remind our readers that on the 13th inst. the use of unstamped meters becomes illegal in all places in which the Sales of Gas Act has been adopted, and that every person who shall after that date "knowingly use any meter which has not been "stamped, shall, on conviction, forfeit a sum not exceeding five "pounds, and any contract, bargain, or sale made by any such "meter shall be void; and every such meter so used shall, on "being discovered by any inspector, be seized, and, on conviction "of the person knowingly using or possessing the same, shall be "forfeited and destroyed." Wherever the Act has not been adopted, unstamped meters may continue to be used. The law in Scotland differs from that of England, for whereas in the latter the Act cannot now be adopted in any additional places, in Scotland, by an Act passed in 1864, "the magistrates of any Royal "burgh whose ordinary jurisdiction has been extended beyond the "bounds thereof, or of any parliamentary burgh having a popula-"tion of twenty thousand, in which the Acts have not been "brought into operation, may, at any meeting to be called for "the purpose, resolve that the provisions of the recited Acts shall "be applicable to the whole district subject to their jurisdiction "on and after a certain date to be fixed by them; and on the said "resolution being come to the magistrates shall publish the same, "and make proclamation thereof, at least three months before the "date so fixed, and thereafter the Acts shall apply to and may be "enforced by the magistrates within the whole district subject to "the jurisdiction of the said magistrates. Provided always that "where in the first-recited Act (Sales of Gas Act, 1859) any-

"thing is required to be done within a specified time after the "passing of the Act, such time shall for the purposes of this Act "be calculated from the date fixed in the said resolution for the "provisions of the said recited Acts coming into operation with "respect to such district." That is, the ten years allowed for the stamping of the meters will be calculated from the date fixed by the magistrates. It is to be understood that the adoption of the Act by the magistrates is purely optional.

The metropolitan gas referees have issued their instructions for the gas examiners for the winter half year. The testing-stations for the South Metropolitan and Imperial Companies being now certified, and the standard in their cases differing from that required of the Chartered Company, the referees give more particular instructions respecting the chimneys to be used with the burner in the two cases. "The burner to be used for testing "the common gas of the Gaslight and Coke Company (which is "required to have an illuminating power of 16 candles) shall be "Sugg's 'London' Argand, No. 1, with a 6-inch by 2-inch "chimney; and for the gas of the Imperial Gas Company and "the South Metropolitan Gas Company (which is required to "have an illuminating power of 14 candles), Sugg's 'London' "Argand, No. 1, with a 6-inch by 1¾-inch chimney. If at any "time the gas-flame tails over the top of the chimney, a 7-inch "by 2-inch chimney shall be used for the 16-candle gas, and a "6-inch by 2-inch chimney for the 14-candle gas." It is ordered that the gas in the photometer shall be lighted at least fifteen minutes before the testings begin, and shall be burned continuously from the beginning to the end of the tests. At stations where common and cannel gas are tested in the same photometer, external burners fitted on the service-pipes are to be kept lighted during the testings. In the cases of the Imperial and South Metropolitan Companies, the instructions direct the actual amount of ammonia in the gas to be determined, while in the case of the Chartered Campany the test is only to ascertain whether any excess over 5 grains in 100 feet be present. In all other respects the instructions are the same as before.

In another place we print two papers relating to the estimation of sulphur in coal gas, read at the recent meeting of the British Association at Liverpool. The apparatus employed by Mr. Vernon Harcourt, it will be seen, is of a complicated kind, and scarcely adapted for the use of ordinary gas examiners. The process, however, is an exceedingly good one, and may be usefully employed when exact results are needed. One essential part of Mr. Harcourt's method is the purification of the air used in the combustion of the gas, a matter which he shows may at times and places be of considerable importance—as, for example, in Manchester, where the sulphurous acid in the atmosphere might add 16 grains of sulphur to that yielded by the 100 feet of gas. This, it is needless to say, is a very exceptional state of the atmosphere, even in Manchester; but the purification of the air is a matter of much consequence when a grain more of sulphur may be the cause of heavy penalties against a gas company. It is, however, only in such methods as Mr. Harcourt's and Mr. Marriott's —presently to be mentioned—in which, by means of an aspirator, a current of air is drawn with the products of combustion through a solution intended to fix the sulphur acid—that the purification becomes of much importance. It will be seen that the results obtained by Mr. Harcourt are singularly uniform—a strong point in favour of the method; and it would be well if we had the results of a number of simultaneous experiments with the same gas made with the new apparatus of the referees. Compared with the latter, Mr. Harcourt's method has the great disadvantage that it can only be applied to very small consumptions of gas. The plan adopted by Mr. Marriott is likewise, no doubt, a good one, but it also is complicated by the use of an aspirator, and only adapted for small consumptions. The oxidation of sulphurous acid, by means of permanganate of potash, must be perfect, and any possible loss of sulphur from the escape of that gas is prevented. Mr. Marriott, however, mistakes the source of the loss of sulphur when the Letheby apparatus is employed. It is not that it escapes in the form of sulphurous acid by the condensing-tube, but that, from want of draught, or from a diversion of the draught, it sometimes is not carried up into the cylinder. This must have happened in some of the experiments made by Mr. Marriott, as, for example, in the last in the table, in which the Letheby apparatus only detected 4·28 grains of sulphur, and the permanganate secured 13·50 grains. We should conjecture that, during this experiment, the trumpet-tube of the Letheby apparatus was exposed to a current of air, against which it ought always to be carefully protected. Altogether, it is only fair to say that if it be established that the new test of the referees gives fairly concordant results, it is, on many accounts, preferable to either of those mentioned above, ingenious and exact as they may be It is, in one respect, the disadvantage of both that they would require skilled hands to conduct them properly, and the parsimony of our public bodies forbids the general employment of well-educated chemists as gas examiners.

It will be noticed that at the end of Mr. Harcourt's paper a hint is given of a new method of purifying gas from sulphur, which seems to reduce the amount of that impurity to a minimum. We hope the new method is one capable of practical application on a large scale.

The audited accounts of the metropolitan gas companies for the year 1869, presented to Parliament in July last, were issued on Saturday last, and we purpose, in our next, giving our usual abstract of them.

With the present number of the JOURNAL our subscribers will receive a supplemental sheet, containing the tenth of the series of drawings of the Chartered Gas-Works at Beckton.

Correspondence.

EXHAUSTER GOVERNORS.

SIR,—The apparatus sketched by "Inquirer" as an exhauster governor, and which is generally known as "Beale's," needs no further demonstration than that which he has given to prove it to be essentially imperfect in principle.

Within very narrow limits of variation, either in pressure of steam or make of gas, it will approximate to the adjusted gas pressure, but for any considerable variation will need readjustment at the point of attachment between the float-spindle and valve-lever. No conceivable intermediate gear could remedy a defect of principle.

My object in writing is to say that, for several years, I have found the best exhauster regulator to be an ordinary balanced gasholder, with a rise of about 2 feet, connected to the throttle-valve lever of the engine, and having a communication from the interior to the hydraulic main. The most minute rise or fall from the adjusted pressure immediately raises or depresses the holder, and opens or closes the steam-way accordingly until the equilibrium of the pressure is restored.

Messrs Stevens and Sons, of Blackfriars Road, have fixed a number of these regulators from a plan I gave them, and have in every case been entirely successful. "Inquirer" would, I think, do well to communicate with them, as, though the apparatus is very simple, its details require attention to ensure efficient action.

H. E. JONES.

Ratcliff Gas-Works, Oct. 4, 1870.

PUBLIC LIGHTING IN CORK.

SIR,—I send you herewith a copy of the *Cork Examiner*, containing a letter of mine in answer to the erroneous statement made by the chairman of the Cork Consumers Gas Company at the half-yearly meeting of the company, held on the 15th ult., an account of which appeared in the last issue of the JOURNAL. Knowing your desire on every occasion to do justice to all, and to give the readers of your JOURNAL the fullest information on every subject, I take leave to ask you to insert it in your next issue.

W. F. COTTON.

Offices of Inspector of Gas-Meters and Public Lighting, Dublin, Oct. 6, 1870.

City Hall, Dublin, Sept. 20, 1870.

Dear Sir,—I am in receipt of your letter, with a copy of the *Cork Examiner* of the 16th inst., containing a report of the half-yearly meeting of the Cork Gas Consumers Company, held on the previous day, at which the chairman of the company is reported to have made a statement in reference to the new system of public lighting which the Corporation of Cork are about to adopt, and which statement is without a particle of foundation, and, I fancy, made in ignorance of the terms of the contract between the corporation and the gas company. The chairman is reported to have said that he made inquiry as to the cause of the strange discrepancy between the high illuminating power of the gas and the imperfect light in the lamps, and that the explanation he received was a very simple one—viz., that the corporation were simply supplying a considerably smaller quantity of gas per lamp than the company were in the habit of supplying; the corporation estimate per lamp for 4000 hours in the year being but a consumption of 12,000 cubic feet, or 3 feet per hour, the company having supplied 5 feet as a rule, but in many cases 6 or 7. He further states that the average quantity the company supplied per annum to each lamp was 18,000 cubic feet, but it frequently rose higher, and that the burners they are putting up under the direction of the engineer of the corporation cannot consume more than 3 feet per hour. To permit a statement so inaccurate to remain uncontradicted would, in my opinion, be an injustice to the corporation and myself, and perhaps to a company whose officials, being present, allowed the chairman to fall into such an error, they being fully aware that one of the chief objects the corporation had in view in adopting the meter system was to be in a position to take advantage of moonlight nights by having the lamps extinguished at an earlier hour, and not, as is frequently the case in Cork, keeping them lighted until long after sunrise at times when they might well have been dispensed with at midnight. The company are also fully aware that 3000 hours, and not 4000 hours per annum, were the numbers calculated on to give 4 feet per hour, the quantity they are bound by the terms of their contract with the corporation to supply. They are aware also that the corporation have not the supplying of the lamp burners or governors, the company being bound by the terms of their agreement to find both, which are to be of the best description, and manufactured capable of passing or consuming 4 cubic feet of gas per hour (and not 3, as stated), with a minimum pressure of 7/10ths of an inch of water, from sunset to midnight, and 5/10ths from midnight to sunrise. If the company at present comply with these conditions, and intend to do so in future, the city of Cork will be as well provided, as regards public lighting, as any city in the kingdom, the rate of consumption provided for by the Cork contract per hour, as per burners, being, with few exceptions, the same as nearly all the large cities in the United Kingdom, and Cork has the further advantage of having the public lamps placed at a much less distance apart than in most of the places referred to. If, therefore, the lights in Cork are defective, that the conditions of the contract are complied with, it must be from some other cause, which, let us hope, the company, as the contractors, will be able to explain. The corporation are not responsible for the

present condition of the light, as, from the company's own statement, it appears that they will not be in a position to hand over the contract of the public lighting to the corporation until the 1st of January, 1871, although they were to have been ready by the 1st of last July. The chairman stated at the meeting that the public lamps are supplied with and consume 5 feet of gas per hour, and some 6 and 7 feet (the company's contract being for 4). There can be no doubt that some of the lamps consume 5, 6, and 7 feet per hour; but it was not stated that a large number of them only consume from 2 to 3 feet, nor was the date given when some of the public lights were made to consume more than the quantity contracted for. It must be patent to any one acquainted with Cork that the lighting of the streets, especially after eleven o'clock at night, was much improved by the company some months previous to the commencement of the present alterations on the lamps, or at the time that the corporation first discussed the question of taking the control of the public lighting in charge. In conclusion, I may state that, having been consulted on the terms of the Cork contract, and taking considerable interest in the good lighting of the city, I think it would be only fair on the part of the gas company to wait until the alterations in the public lighting are finished, and the lamps handed over to the corporation, and not to anticipate dissatisfaction while the changes now in progress are necessarily incomplete.—Yours, &c., W. F. COTTON.

Miscellaneous News.

CRYSTAL PALACE DISTRICT GAS COMPANY.

The Ordinary Half-Yearly General Meeting of this Company was held at the London Tavern, on Thursday, Sept. 29—ERASMUS WILSON, Esq., F.R.S., in the chair.

The SECRETARY (Mr. Magnus Ohren) having read the advertisement convening the meeting, the following report and statement of accounts were presented:—

The directors have to report that the business and progress of the company have been satisfactory during the half year.

The price of coal has been higher, but the coke and other products have realized more than those of the corresponding half of the previous year.

Notwithstanding the reduction in the price of gas, it will be seen that the rental has considerably increased.

The reports of the chemical adviser of the company and of the medical officers of the parishes supplied by the company, on the purity and illuminating power of the gas, continue to be satisfactory. During the half year, 23 visits have been made to the works (without notice) by Dr. Letheby on the part of the company, and Dr. Puckle and Dr. Bernays on behalf of the parishes of Lambeth and Croydon respectively; and the average result of these examinations of the gas of the company has given an illuminating power of 15·48 standard sperm candles.

The gasholder, reported upon at the last meeting, is progressing to the satisfaction of the engineer.

The balance-sheet for the half year to the 30th of June—appended to this report—shows the financial position of the company. The profit for the half year is £6220 12s. 5d., which, together with £130 15s. 11d., the unappropriated profit of the preceding half year, makes the available balance £6351 8s. 4d. Out of this sum the directors recommend the declaration of a dividend at the rate of 6 per cent. per annum on the preference capital; a dividend at the rate of 7 per cent. per annum on the ordinary 7 per cent. capital; and a dividend at the rate of 10 per cent. per annum on the original capital—all free from income-tax. They also recommend that, out of the balance, the sum of £250 be written off preliminary expenses, and that the balance of £73 8s. 3d. be carried forward to the profit of the succeeding half year.

Dr. *Profit and Loss, Half Year ending June 30, 1870.* *Cr.*

To Amount of coals carbonized		£9,421	19	5		
Lime, oxide, and labour		191	15	3		
Trade charges		1,436	13	3		
Horses and carts		29	16	6		
Mains renewal account		174	18	1		
Works renewal ditto		913	6	7		
Meters renewal and repairs account		548	3	2		
Rents, rates, and taxes		755	1	6		
Directors and auditors fees		530	0	0		
Salaries and collectors commission		1,420	4	6		
Wages		2,819	10	3		
Interest on loans		440	16	2		
Bad debts and allowances on collection		200	6	6		
Law charges		2	12	6		
Retort account		500	0	0		
Contingent-fund		2,301	7	10		
Profit		6,220	12	5		
		£27,907	3	11		
By Private rental, Lady Day quarter					£12,937	14 11
Public ditto, ditto					1,287	2 11
Private rental, Midsummer quarter					6,274	8 4
Public ditto, ditto					1,198	9 5
						£21,697 15 7
Meter-rental						355 10 2
Coke made for sale					£4,604	15 0
Breeze ditto					74	14 0
Tar ditto					372	9 7
Sundries					2	7 8
						5,054 6 3
Sulphate of ammonia—net profit						799 11 11
						£27,907 3 11

Dr. *Balance-Sheet, June 30, 1870.* *Cr.*

Proprietors for paid-up capital—						
5000 preference shares, at £10 per share				£50,000	0	0
5000 original shares, at £10 per share				50,000	0	0
10,000 ordinary 7 per cent. shares, at £10 per share	£100,000	0	0			
Less amount uncalled	42,057	0	0			
				57,943	0	0
Loans on debenture				16,550	0	0
Amount due to sundry persons				7,154	19	9
Contingent-fund—						
Uninvested	£1,563	18	2			
Invested	134	14	0			
Appropriated from profit and loss for contingent-fund	2,301	7	10			
				4,000	0	0
Profit unappropriated				130	15	11
Profit and loss				6,220	12	5
				£191,999	8	1
By Amount for plant, &c.					£157,500	9 8
Freehold land					8,886	17 8
Preliminary expenses					3,000	0 0
Retort account					698	13 8
Stock on hand					6,678	17 0
Amount due from sundry persons					844	19 9
Invested in Consols from contingent-fund					134	14 0
Private gas and meter rental, Midsummer quarter					6,253	4 7
Arrears					463	19 1
Public rental, Midsummer quarter					1,198	9 5
Fittings					1	0 9
Balance at bankers					6,338	2 6
					£191,999	8 1

Appropriation of Balance.

Balance brought forward from last account				£130	15	11
Ditto of profit and loss				6,220	12	5
				£6,351	8	4
Dividend on preference share capital, at 6 per cent.				£1,500	0	0
Ditto on ordinary 7 per cent. capital, at 7 per cent.				2,028	0	1
Ditto on original share capital, at 10 per cent.				2,500	0	0
					£6,028	0 1
Preliminary expenses, to be written off					250	0 0
Balance to be carried to next account					73	8 3
					£6,351	8 4

The CHAIRMAN, in moving the adoption of the report, said he had very few remarks to offer to the shareholders. He had little to say, simply because the affairs of the company were thriving. They were going on well; they had suffered no drawbacks; they had nothing sensational to report. In fact, to say anything on this occasion, it would be necessary to descend to the domestic level, and tell the meeting that the directors had established the means of distributing coke by their own vans, which was a great convenience to their customers, and enabled the company to dispose of much more coke than formerly they could do. They had also established, very much to the satisfaction of their consumers, cooking-stoves, which were capable of cooking both large and small dinners, and during the summer months were eagerly sought after. He did not think it needful to refer to the advantages of gas cooking-stoves; those advantages were readily acknowledged; but he confessed that he was unprepared to believe they would become so popular as the company had found them to be in their district. One short paragraph in the report he was sure would be very pleasing to the shareholders. It related to the positive increase in the rental for the half year, although in opposition to, and as against a considerable reduction in the price of gas. The directors had also been carrying out some of those improvements which had for their object the future success of the company—such as the laying of larger mains, and in that way counteracting the necessity for high pressures, and consequently controlling and reducing to the minimum the leakage and loss of gas. There was also another paragraph in the report which must give the shareholders satisfaction, because it carried with it the conviction that the directors were endeavouring to do their duty by supplying a first-rate article. He referred to the testing of the gas. There were, as the shareholders were aware, professional gas testers, who, without any warning to the companies, tested their gas at various places, in order to guarantee to the public that the illuminating power and purity of the gas were equal to the high standard required by the Legislature. The directors themselves had secured the services of Dr. Letheby, the eminent analytical chemist, and it would be seen by the paragraph in the report that the whole of the tests made had been in the highest degree satisfactory. It would be in the remembrance of the proprietors that the company had been erecting a new gasholder. That gasholder was one of very handsome proportions, and in all respects a very excellent vessel. The directors felt somewhat personally indebted in the matter to the contractors, Messrs. Hanna, Donald, and Wilson; and they felt persuaded, from their own observation as well as from the tests made, that it would turn out an admirable holder. There was also in connexion with the company a provision of which every foreseeing man felt the importance—viz., an insurance of their property. One of the London insurance companies—the Law Union—had undertaken the insurance of the works against fire, explosions, and also against the spontaneous combustion of coal. So that in whatever position they turned, he thought the shareholders would see that they were in the position of the good housewife, who had always a needle and thread for every emergency. Looking at the financial part of the report, it would be seen by those who analyzed the figures that there had been a good many rather important "writings off" in the profit and loss account. After writing off liberally and extensively, they came to the satisfactory conclusion that the balance of profit was one which would meet all the demands which could possibly be made upon it. There was a dividend for the original capital, as much as it would carry, and there were dividends for the 6 per cent. preference and ordinary 7 per cent. capital; and when these were all provided there remained a small but sufficient balance to be carried to the ensuing half year. He had no doubt the business of the next half year would provide the shareholders with equally good results on the occasion of their meeting again.

Mr. H. P. STEPHENSON (deputy-chairman) seconded the motion.

Mr. HADLAND said this was the first time he had seen an actual charge for insurance grafted upon a gas company's account. He had always imagined the rate would be so high that it was to the interest of gas companies to be their own insurers.

Mr. STEPHENSON said the company had insured their works for many years, having been originally driven into it by the stipulations of their old lease. The insurance applied to the buildings, and also to coals, it did not apply to the gasholders. The insurance varied from 2s. to 10s.

The motion was put, and carried unanimously.

Mr. STEPHENSON moved, and Mr. HADLAND seconded, the payment of the dividends recommended in the report, which was put, and agreed to.

Mr. GLAISHER moved, and Mr. BENGOUGH seconded, a vote of thanks to the directors, which was cordially adopted.

The CHAIRMAN acknowledged the vote, and proposed a resolution conveying to the auditors and officers of the company the thanks of the meeting for the efficient discharge of their duties.

Mr. HADLAND seconded the motion, which passed unanimously.

Mr. JOHN GRAY, one of the auditors, acknowledged the vote.

Thanks having been passed to the chairman for his services, the proceedings terminated.

BARNSLEY.—On the evening of Monday, Oct. 3, the town of Barnsley wore an unusually gay aspect, many of the principal buildings being illuminated, in commemoration of the opening of the Barnsley Gas Company's new works at Old Mill, which have recently been completed at a cost of nearly £60,000. After the formal opening, the chairman of the company entertained a select company at luncheon, and in the evening an excellent supper was provided for the workmen.

SOUTH METROPOLITAN GASLIGHT AND COKE COMPANY.

The Ordinary Half-Yearly Meeting of the Proprietors of this Company was held at the London Tavern, on Monday, Oct. 3—THOMAS BRIDGE SIMPSON, Esq., in the chair.

The SECRETARY (Mr. Livesey) read the notice convening the present meeting, and the minutes of the last half-yearly meeting; also the following report of the directors:—

At a meeting of proprietors in April last, the directors reported that it would be necessary in the course of the present year to make another call on the new capital, to meet the large outlay contemplated for a new retort-house and new mains, with other minor extensions and additions to the works. Since then a considerable portion of the work has been done; the mains have been extended in several parts of the district, and the retort-house will be ready for use before the expiration of the year.

These several works have reduced the unexpended capital much below the amount required for the profitable working of the business; and therefore the directors, as the proprietors have already been advised, have made a call of 30s. per share, payable on the 1st inst.

The accounts to be submitted to the meeting have been certified by the company's auditors, and also by the official auditor. By these accounts it will be seen, by comparison with the corresponding period of 1869, that the rental for gas is less by about £350, arising from the reduction of 5 per cent. in the price; but there is very little doubt that the account for the year at the lower price will be more than that of the preceding year.

As a set-off to this trifling diminution in the rental, there is an increase in the item of receipts for products of upwards of £2000 over the half year to June 30, 1869.

The rental for gas and the receipts for products for the half year amount to £57,894 4s. 3d., and the expenditure to £40,512 15s. 11d., leaving a balance of £17,381 1s. 4d. for the payment of the usual dividend of 10 per cent. on the paid-up capital of the company.

The room for testing the company's gas has, after much delay in fitting up, been in operation since the early part of July, and the report from the official examiner has been so far satisfactory.

The CHAIRMAN: Gentlemen, in moving the adoption of the report, it is not necessary that I should occupy your time with any statistics, because I believe you will find in the accounts themselves everything upon which you can desire to be informed. The principal object of meetings like the present is that an opportunity may be given to your directors to inform you of the position of your property, and of the prospects which lie before you; and also to report to you if anything of a striking or important character has taken place since they had the pleasure of seeing you before. With regard to any occurrences which arise between our meetings, we have seldom anything to tell you; they are usually small matters which we meet and dispose of as they arise. The only thing which does strike me as being necessary to mention to-day is the great increase in our parochial rates. We are now before the Assessment Committee upon the subject, and if we do not obtain what we regard as a fair and equitable settlement of the question, we shall make our appeal to quarter sessions. In doing so, I am sure we shall have your sanction, as it is a very important consideration in relation to your interests. With regard to the reduction in the rental, you will see that it is only to a very small extent, considering the great reduction there has been in the price of gas, and you will see too, that, notwithstanding the reduction of rental, there is no reduction in our profits. We are able to provide out of them the amount necessary to pay you 10 per cent. I congratulate you, gentlemen, on the position of your affairs—that you have a sound undertaking, and that there does not appear to be anything likely to militate against the continued prosperity of the company.

A SHAREHOLDER: What are we at present rated at?

The SECRETARY: £7000 in Camberwell.

The CHAIRMAN: And now the authorities want to increase it to £12,000. We shall also have our assessments increased in other parishes; therefore we have determined to proceed with an appeal, provided we do not get something like justice done to us in the Assessment Committee; and we are quite sure we shall have your sanction in so doing.

Mr. GRAY: I second the motion; and in doing so I feel it incumbent upon me to make a few observations which will all be of a complimentary character. My worthy friend has very briefly stated the position in which the company is placed, and I have no hesitation in saying that there is no company in the metropolis, or indeed out of it, which stands in a higher and more satisfactory condition. Our affairs are very admirably managed, so as to secure at once the interests of the proprietors, and the just and reasonable requirements of the public. I quite agree with what the chairman has said as to the necessity for taking steps to oppose the heavy charges imposed by the parochial authorities upon the gas companies of London. A circumstance has recently occurred to the company with which I am connected, in one of our districts, where our assessment had been increased from £280 to £600; but we appealed against it and got it reduced. I hope my worthy friend here, and his colleagues, will be able to come to some satisfactory arrangement; but if not, they have no alternative than an appeal to a higher court. Parochial people have looked upon gas companies as fair game for every species of imposition; but I trust this state of things will come to an end, and that an equitable understanding will be brought about. I congratulate the proprietors on the state of our affairs. The price charged for gas is very low, we have a fine district, and I see no reason to doubt that it will be very much developed. The directors have laid down some large mains, which I believe had become absolutely necessary, as complaints had been made of insufficiency, but henceforth every one will be satisfied with the quantity of gas supplied. The accounts now laid before us are very satisfactory, and without trespassing further on the time of the meeting, I shall conclude what I have to say by expressing a hope that my worthy friend and his colleagues may long preside over the company, and continue to enjoy the personal esteem and regard of all the shareholders.

The motion was put, and carried unanimously.

The SECRETARY presented the following statements of account:—

Revenue Account.

To Coals	£20,559	4	9	By Gas, at 3s. 2d. per 1000 feet	£33,850	3	6
Purifying material, &c.	550	9	1	Public lighting	6,383	10	9
Salaries, engineer, &c.	633	1	1	Coke, less labour loading	9,225	1	2
Wages	5,870	12	3	Breeze	211	10	5
Repairs and maintenance, less old materials sold	2,197	13	8	Tar	1,184	12	3
Repair and renewal of mains, &c.	2,311	13	11	Liquor	1,359	10	11
Salary of clerks and inspectors	1,144	19	6	Rents	243	15	1
Repairing and renewing meters	647	2	0	Transfer-fees	2	17	6
Lighting and repairing lamps	1,499	12	0	Interest	433	2	8
Rent	267	18	4				
Rates and taxes	1,449	16	2				
Directors	600	0	0				
Auditors	50	0	0				
Salary, secretary, &c.	634	10	0				
Collectors commission	834	7	11				
Stationery and printg.	116	15	6				
General charges	365	6	9				
Superannuation-fund	54	12	0				
Gas referees, auditors, &c.	107	13	0				
Bad debts and allowance	534	14	9				
Law and parliamentary	77	13	3				
Balance	17,381	8	4				
	£57,894	4	3		£57,894	4	3

Balance-Sheet.

To Balance of capital	£17,055	14	9	By Consols—reserve-fund	£20,000	0	0
Reserve-fund	20,000	0	0	Ditto—renewal-fund	8,077	11	7
Renewal-fund	8,077	11	7	Cash at bankers	24,537	17	7
Profit and loss account	26,796	17	10	Cash in hand for freight accounts, &c.	400	0	0
Sundry creditors	4,439	16	3	Stocks—			
Deposits	1,458	7	6	Coals	4,053	15	3
Property-tax account	65	3	10	Coke and breeze	60	15	0
				Tar and liquor	185	11	7
				Mains and meters	1,990	19	0
				Amount due for—			
				Gas	17,671	14	7
				Products	441	10	5
				Sundries	158	8	1
				Interest	315	8	8
	£77,893	11	9		£77,893	11	9

On the motion of the CHAIRMAN, the accounts were received, and ordered to be entered on the minutes.

Mr. MAUGHAN: I think the thanks of the meeting are eminently due to our worthy chairman and his colleagues for the very satisfactory manner in which they have managed our affairs in the last half year. I do not believe we could get up a little grumble even were we disposed to try.

Captain HENNING seconded the motion, which was cordially agreed to.

The CHAIRMAN: Gentlemen, I assure you it is very gratifying to receive these continual marks of your favour. We have great pleasure in serving you, particularly when we look back upon former days, when our meetings were very different to what they are now. It is always satisfactory when shareholders are content with the proceedings of the directors, and as you are pleased to express yourselves in that sense, I can only say we are very happy in the position we hold. I should have remarked before that we have laid down large mains in a considerable portion of our district, which I believe will remove any cause of complaint as to the quantity of supply, but we generally find upon examination that such complaints arise more than anything else from the defective fittings of consumers. I cordially and heartily thank you for the compliment you have paid us, and assure you that while we enjoy your confidence no effort will be wanting on the part of the directors to ensure the continued prosperity of the company.

Mr. GRAY: I am unwilling that the proprietors should separate without affording me the opportunity of paying the compliment to which our worthy friend, the engineer of the company, is entitled. Every one present will agree with me that much of the success of a company like this depends upon the way in which the engineer manages his department, and I am sure I represent the feeling, too, of my friends, the directors, when I say that we have the advantage of a very skilful and talented engineer, who leaves no means untried, nor any effort unattempted, to ensure the satisfactory working of the concern. I beg to move a vote of thanks to Mr. Livesey.

The motion having been seconded,

The CHAIRMAN: This resolution I put with very great pleasure, for I am sure my brother directors quite coincide in the views expressed by Mr. Gray.

The resolution was cordially and unanimously agreed to.

The SECRETARY: Mr. Chairman and gentlemen, I thank you very sincerely for the vote of thanks passed in my favour, though, properly speaking, it does not belong to me, as my son, Mr. George Livesey, has been the engineer of the company for some years, and has had the management of the works. I am only the secretary and general manager. As engineer, he is entitled to the credit which you have been pleased to acknowledge. I thank you, however, for the kind expression of your feelings towards me.

Mr. MAUGHAN: We are much obliged to you for having trained up a son in the way he should go.

The proceedings then terminated.

THE GASLIGHT AND COKE COMPANY.

The Half-Yearly Ordinary Meeting of the Shareholders of this Company, which now consists of the Chartered, City of London, and Great Central Gas Companies, was held at the Works, Horseferry Road, Westminster, on Friday, Oct. 7.—The Hon. RICHARD HOWE BROWNE (deputy-governor) in the chair.

The SECRETARY (Mr. J. O. Phillips) read the notice convening the meeting, and the minutes of the last general and special meetings, which were approved. The corporate seal was affixed to the register of shareholders.

The following report and statement of accounts were laid before the meeting:—

The directors have the pleasure to report that, since the publication of their last half-yearly statement, the position of the company has been materially fortified by a union with the City of London and Great Central Gas Companies, both of which, under schemes of amalgamation approved by the Board of Trade and confirmed by the Queen in Council, now form part of the Gaslight and Coke Company.

The bill introduced into Parliament in the last session, for authorizing the purchase of the undertaking of the Victoria Docks Gas Company, has also received the Royal Assent, and the directors are now preparing for the completion of that purchase, which will place in their hands a district of large area, offering a wide scope for the extended operations of the company. The Beckton station, situate within this area, is so rapidly approaching completion as to admit of the almost immediate manufacture of gas there, and the directors are of opinion that, by a connexion now in progress of that station with the works situate at Bow, Blackfriars, and Westminster, by telegraph as well as by mains, they will be enabled, before the termination of the present year, to discontinue entirely the more expensive manufacture now carried on at the Brick Lane and Curtain Road stations.

The directors regret to announce that, in consequence of a general rise in prices, the cost of their coal at the pit's mouth will be increased after the close of the current contract; but so large an economy is evident in the means of discharge of colliers which the pier and other appliances at Beckton will afford, that they entertain no doubt of such additional expenditure being more than compensated for by the reduction in working expenses which they will thus be enabled to effect.

It is gratifying to the directors to be able to state that the capabilities of these great works are likely to be still further developed by means of communication with the lines of railway which afford access from the east of London to the Midland and Eastern Counties of England, an agreement having been recently concluded with the Great Eastern Railway Company for the construction of a railway from their own system to Beckton, by means of which the company will secure an additional outlet for coke and other products, and, at the same time, be enabled to obtain supplies of inland coal in competition with that now brought wholly by sea from the north.

The new capital which it has been necessary to raise for the purposes of the undertaking has been most eagerly taken up and subscribed for by the existing proprietors, whose demands for shares were altogether beyond the means of the directors to satisfy, and the very best evidence has thus been afforded of the warm approval of their constituents of the policy adopted by the directors. It may be convenient to shareholders to receive the intimation that calls during the present year will in all probability be made somewhat as follows:—

By Oct. 31, on first issue of 5 per cent. preference shares, £3 per share.
„ Dec. 1, on balance of A shares, £5 ditto.
„ Dec. 31, on first issue of 5 per cent. preference shares, £3 ditto.

The directors have further only to report that the aggregate profit for the half year ending the 30th of June last, after making provision for debenture interest and preference shares, enables them to recommend a dividend on the ordinary shares at the rate of £9 per cent. per annum, the warrants for which will be issued, as usual, fourteen days after the day of the meeting.

THE GASLIGHT AND COKE COMPANY.

Half Year ending June 30, 1870.

No. 1.—STATEMENT OF SHARE AND LOAN CAPITAL, *to June* 30, 1870.

Act of Parliament regulating the Capital of the Company.	Description of Capital.	Maximum Dividend authorized, or Interest paid.	Number of Shares issued.	Nominal Amount of Shares.	Called up per Share.	Total paid up.	Amount not paid up or unissued.	Total Amount authorized.
The Gaslight and Coke Company's Act, 1868.	Share A.	Maximum dividend 10 per cent.	112,000	£10 0 0	£10 0 0	£1,120,000	..	£1,120,000
	Ditto.	Ditto.	8,000	10 0 0	5 0 0	40,000	£32,925	80,000
			Amount received in anticipation of calls			7,075		
	Share B.	4 per cent.	10,000	10 0 0	10 0 0	100,000	..	100,000
	Share C.	10 per cent. preference.	20,000	10 0 0	10 0 0	200,000	..	200,000
City of London Gas Company's Act, 1859.	Share.	5 per cent. preference, with option of conversion.	25,000	10 0 0	2 0 0	50,000	68,937	250,000
			Amount received in anticipation of calls			131,063		
	Ditto.	Ditto.	20,000	10 0 0	1 0 0	19,946	176,295	200,000
			Amount received in anticipation of calls			3,759		
	Ditto.	..	..	..	..	..	200,000	200,000
The Great Central Gas Consumers Act, 1851.	Loan.	5 per cent.	..	..	..	125,500	..	126,000
	Ditto.	4 ,,	..	..	..	500		
	Ditto.	4½ ,,	..	..	..	300,000	..	300,000
	Ditto.	4½ ,,	..	..	..	32,500	30,000	62,500
	Ditto.	..	..	..	..	..	100,000	100,000

In pursuance of the scheme for the amalgamation of the City of London Gaslight and Coke Company with the Gaslight and Coke Company, approved by the Board of Trade, and confirmed by the Queen in Council on the 31st of March, 1870, the £20 shares in the City of London Gaslight and Coke Company, and the £50 shares in the Gaslight and Coke Company, have been converted into shares in the United Company of the nominal value of £10 per share.

No. 2.—CAPITAL ACCOUNT, *for the Half Year ending June* 30, 1870.

Dr. *Cr.*

	Expenditure from June 24, 1868, to Dec. 31, 1869.	Expended this Half Year.	Total to June 30, 1870.
	£ s. d.	£ s. d.	£ s. d.
To Expenditure to June 24, 1868 . .	..	..	1,449,483 15 8
Since June 24, 1868—			
Lands acquired, including law charges . .	63,536 0 10	44,433 9 4	107,969 10 2
Buildings, manufacturing plant, storeage, and other structures connected with manufacture .	141,548 14 10	133,373 6 4	274,922 1 2
New mains and service-pipes, including laying, paving, and other works connected with distribution	74,416 7 1	14,557 10 4	88,973 17 5
Meters (additional), including fixing	23,982 7 10	354 17 3	24,337 5 1
Parliamentary costs	2,894 8 9	585 13 0	3,480 1 9
Interest on loans	8,607 16 1	9,406 14 1	18,014 10 2
	314,985 15 5	202,711 10 4	1,967,181 1 5
Balance of capital account			163,161 18 7
Total			2,130,343 0 0
Note.—Total outlay of capital at Beckton Works, up to Dec. 31, 1869 .			279,232 4 2
Ditto, in half year to June 30, 1870			199,577 14 2
			£478,809 18 4

	Certified Receipts to Dec. 31, 1869.	Received during Half Year.	Total Receipts to June 30, 1870.
	£ s. d.	£ s. d.	£ s. d.
By Ordinary shares, of £10 each . .	1,120,000 0 0	..	1,120,000 0 0
Ditto ditto, £5 paid	40,000 0 0	..	40,000 0 0
Amount in advance of calls . .	6,825 0 0	250 0 0	7,075 0 0
B shares, of £10 each	100,000 0 0	..	100,000 0 0
C ditto, ditto	200,000 0 0	..	200,000 0 0
5 per cent. preference shares, of £10 each	24,870 0 0	25,130 0 0	50,000 0 0
Amount in advance of calls . .	109,166 0 0	21,897 0 0	131,063 0 0
5 per cent. preference shares, of £10 each	..	19,946 0 0	19,946 0 0
Amount in advance of calls . .	..	3,759 0 0	3,759 0 0
Debentures	426,000 0 0	32,500 0 0	458,500 0 0
	2,026,861 0 0	103,482 0 0	
Total			£2,130,343 0 0

No. 3.—REVENUE ACCOUNT, *for the Half Year ending June* 30, 1870.

Dr. *Cr.*

	£ s. d.	£ s. d.
To Manufacture of gas—		
Coals, including carriage, trimming, and dues (*see* Account No. 6)	129,558 3 4	
Purifying materials, water, &c. . . .	2,546 3 6	
Salaries of superintendents and officers at works	2,629 0 0	
Wages at works (manufacture)	29,741 14 0	
Repairs and maintenance of works and plant, including renewal of retorts, machines, apparatus, materials, and labour	11,339 1 7	
	175,814 2 5	
Less old materials sold	665 17 11	
		175,148 4 6
Distribution of gas—		
Repair, maintenance, and renewal of mains and service-pipes, including materials, laying and paving, and labour	5,717 4 5	
Salaries of inspectors, assistant inspectors, and clerks in Light Office	2,740 6 9	
Meters—repairing, renewing, and refixing .	5,071 0 6	
		13,528 11 8
Public lamps—		
Lighting and repairing	..	4,109 3 1
Rents, rates, and taxes—		
Rents	1,745 16 8	
Rates and taxes	4,597 4 0	
Income-tax on rents	68 19 7	
		6,412 0 3
Management—		
Directors allowance	3,000 0 0	
Salaries of secretary and office clerks . .	2,750 2 9	
Collectors commission	3,604 19 2	
Income-tax on salaries	333 15 10	
Stationery, printing, and general establishment charges	1,896 8 4	
Company's auditors	182 2 0	
		11,767 8 1
Public officers—		
(*Company's proportion.*)		
Gas referees expenses	61 16 10	
Ditto remuneration		
Chief gas examiner's ditto	656 16 9	
Official auditor's ditto		
		718 13 7
Law and parliamentary charges—		
Law	859 9 3	
Parliamentary (*oppositions*)	547 19 9	
		1,407 8 8
Depreciation-fund for works on leasehold lands .	..	100 0 0
Annuities to superannuated officers and workmen	..	509 19 8
Bad debts	..	1,914 14 3
Sick and benevolent fund	..	100 0 0
		215,716 3 9
Balance carried to net revenue account		69,165 12 9
		£284,881 16 6

	£ s. d.	£ s. d.
By Sale of gas—		
Common gas (947,745,561 cubic feet), at 3s. 9d. per 1000 cubic feet	177,702 11 1	
Cannel gas (140,484,292 cubic feet), at 5s. 5d. per 1000 cubic feet	38,048 4 3	
Public lighting and under contracts . . .	18,434 14 11	
		234,185 10 3
Rental of meters	..	2,017 11 9
Residual products—		
Coke (Account No. 7)	37,035 3 11	
Breeze	375 6 7	
Tar	8,084 5 8	
Ammoniacal liquor	2,438 16 9	
		47,933 12 11
Rents	..	698 10 7
Transfer fees, &c.	..	46 11 0
		£284,881 16 6

Dr. No. 3A.—DEFALCATION ACCOUNT, *June* 30, 1870. *Cr.*

	£ s. d.		£ s. d.	£ s. d.
To Amount abstracted	71,149 6 10	By Balance of net revenue account of the Great Central Gas Consumers Company, to Dec. 31, 1869	56,290 19 5	
		Less dividend to be paid them to this date	15,000 0 0	41,290 19 5
		Amount brought from net revenue account, for the half year to June 30, 1870		2,500 0 0
				43,790 19 5
		Balance		27,358 7 5
	£71,149 6 10			£71,149 6 10

Dr. No. 4.—NET REVENUE ACCOUNT, *for the Half Year ending June* 30, 1870. *Cr.*

	£ s. d.		£ s. d.	£ s. d.
To Income-tax on profits	698 8 4	By Balance of net revenue, Dec. 31, 1869	52,599 18 8	
Interest on temporary loans	702 14 9	Less dividend declared for the half year ending that day	50,740 19 6	1,858 19 2
Dividend on B shares, at 4 per cent., less income-tax	1,962 10 0	Interest received		55 4 4
Ditto on C ditto, at 10 ditto, ditto	9,812 10 0	Balance from revenue account, No. 3		69,165 12 9
Interest on debentures accrued to June 30, 1870	3,147 10 0			
Ditto on calls paid in advance	173 11 2			
Penalties and costs	320 16 5			
Defalcation account	2,500 0 0			
	19,318 0 8			
Balance of net revenue applicable to dividend	51,761 15 7			
	£71,079 16 3			£71,079 16 3

No. 5.—INSURANCE-FUND ACCOUNT.
(The company have at present no insurance-fund.)

Dr. No. 5A.—DEPRECIATION-FUND ACCOUNT (for Works on Leasehold Lands), *for the Half Year ending June* 30, 1870. *Cr.*

	£ s. d.		£ s. d.
To Balance	1,814 15 4	By Balance on Dec. 31, 1869	1,687 14 9
		Brought from revenue account	100 0 0
		Interest on amount invested	27 0 7
	£1,814 15 4		£1,814 15 4

No. 6.—STATEMENT OF COALS USED, &c., *during the Half Year ending June* 30, 1870.

Description of Coal.	In Store, Dec. 31, 1869.	Received during Half Year.	Carbonized or Used during Half Year	In Store, June 30, 1870.
	Tons. Cwt.	Tons. Cwt.	Tons. Cwt.	Tons. Cwt.
Common	17,620 18	117,544 10	118,914 14	16,250 14
Cannel	9,752 11	22,663 8	23,969 5	8,446 14

No. 7.—STATEMENT OF RESIDUAL PRODUCTS *made and disposed of during the Half Year ending June* 30, 1870.

Description of Residual.	In Store, Dec. 31, 1869.	Made during Half Year.	Used in Manufacture during Half Year.	Sold during Half Year.	In Store, June 30, 1870.
Coke—					
Common . . . chaldrons.	1,365¼	124,338¼	43,079¼	82,182¼	441¼
Cannel . . . „	271¼	8,736	1,608¼	7,389¼	10
Breeze . . . „	1,535 29 bush.	11,133¼	680	11,119	870 9 bush.
Tar . . . gallons.	146,987	1,320,979	..	1,349,128	118,838
Ammoniacal liquor . . . „	104,020	2,811,415	..	2,835,336	80,099

Dr. GENERAL BALANCE-SHEET, *on June* 30, 1870. *Cr.*

	£ s. d.		£ s. d.	£ s. d.
To Capital account—		By Cash at bankers	..	41,450 2 7
Balance at credit thereof (Account No. 2)	163,161 18 7	Ditto on deposit at interest	..	67,000 0 0
Net revenue account—		Ditto invested at ditto	..	31,814 15 4
Balance at credit thereof (Account No. 4)	51,761 15 7			
Insurance-fund account—		Stores on hand, viz.:—		
Balance at credit thereof (Account No. 5)	..	Coals	27,890 11 5	
Depreciation-fund (for works on leasehold lands)—		Coke and breeze	255 19 3	
Balance at credit thereof (Account No. 5A)	1,814 15 4	Tar and other products	843 0 3	
Unpaid dividends	6,178 8 8	Sundry stores	12,063 3 9	
Dividends accrued due, and provided for to June 30, 1870	31,159 14 8			41,052 14 8
Interest accrued due, and provided for to June 30, 1870	8,689 15 2	Outstanding accounts due to the company, viz.:—		
Amount due for coals and to sundry tradesmen and others	33,684 3 0	Light account	98,518 7 10	
Ditto due for wages	1,554 8 10	Coke and other products	6,926 10 7	
Mr. Benham's benevolent-fund	1,181 5 0	Sundry accounts	10,119 3 3	
Temporary loans	25,800 0 0			115,564 1 8
		Ship *Dispatch*	..	746 3 2
		Defalcation account (Great Central Company)—		
		Balance at debit thereof (Account No. 3A)	..	27,358 7 5
	£324,986 4 10			£324,986 4 10

I certify that the above accounts are correct, and that the balance of net revenue, for the half year ending June 30, 1870, is £51,761 15s. 7d., and that such amount subject to deduction for income-tax, is applicable to payment of dividend on the ordinary stock.

September 21, 1870. (Signed) CHAS. H. PARKES, *Official Auditor.*

The CHAIRMAN: Gentlemen, before addressing myself to the business which calls us together to-day, allow me, on behalf of my brother directors in this court, and upon my own part, to express to you the very great regret we feel at the absence from the chair on this occasion of our excellent governor, Mr. Beck. I believe I am correct in stating that since the moment that you elected Mr. Beck to the important position of governor of this company, this is the first occasion upon which he has been absent from his post. His absence to-day is the more to be deplored, as I am grieved to have to state that it is caused by severe illness. Those shareholders of the Chartered Company who have been in the habit, half year by half year, of witnessing the kind and genial deportment, and the thorough businesslike manner with which Mr. Beck has always presided over the proceedings of these meetings, will, I am sure, participate in the regret experienced by the directors at his absence on the present most interesting occasion. I need not say that I am sure too that Mr. Beck himself feels the greatest possible disappointment at not being in his accustomed place, and that it would have afforded him the utmost satisfaction to preside for the first time over a meeting such as I now see before me. We can only hope and pray that God in his mercy will speedily restore Mr. Beck in renewed health and strength to his anxious family and to us. Gentlemen, in moving the adoption of the report which has been circulated amongst you, and which, with your usual consideration, you have been good enough, for the sake of saving time, to "take as read," I would remark that the report enters so fully into the details of the management of this great concern during the last half year, that it will not be necessary for me to occupy much time in commenting upon it. However, I shall take the opportunity of making a few remarks upon the different points contained in the report, and if, at the conclusion of my speech, I should have omitted to render to every proprietor all the information he may require, I shall be happy to supplement my observations by answering any question proposed to me to the best of my ability, consistent with the interests of the company. Gentlemen, the first matter alluded to in the report is the great fact of the amalgamation of our company with the City of London and Great Central Gas Consumers Companies—an arrangement which has been come to since we last met you in this room. This arrangement has been carried out through the agency of the Board of Trade, and has obtained the sanction of Her Majesty in Council, thus giving it all the authority of an Act of Parliament, with this simple difference in the mode of procedure, that whereas we have now gained all we wanted at an inconsiderable cost, we should, if we had carried out the arrangement through Parliament, have been put to very serious expense. This fact must, I think, be very satisfactory to the proprietors. For myself, gentlemen, from the first I never had the slightest doubt in my mind as to the policy of these amalgamations. I felt from the first, that, situated as our company was, these amalgamations were essential to our permanent prosperity, and I have no

reason now to alter that opinion in the slightest degree. I am perfectly confident that these amalgamations will tend not only to the advantage of the parent gas company, but to the advantage of every one concerned. Gentlemen, it will not be possible for me to-day to lay before you that detailed statistical comparison of the working expenditure of the company which our excellent governor has been in the habit of giving you; and for this simple reason, that all the accounts of the united companies, both as to revenue and expenditure, have passed into one account; and, therefore, it is not practicable to analyze them with that degree of nicety which it has been the custom of Mr. Beck hitherto to do, so far as relates to the Chartered Company. It will be, however, satisfactory to you to know that we consider the working of the large united concern as eminently satisfactory during the last half year to the 30th June, and we have realized a profit upon our general working sufficient, I hope, in your opinion, to be accepted as very satisfactory. We have realized a profit sufficient to declare to you to-day a very good dividend upon your investment, and this, gentlemen, has been achieved notwithstanding that the Act of Parliament passed in 1868 has been in full operation during the whole period, that Act imposing upon us very severe restrictions as to the price of gas and its illuminating power and purity. In the last session of Parliament we applied for and obtained an Act for the purchase by this company of the Victoria Docks Gas Company. As compared with our own undertaking, the Victoria Docks Gas Company is a very small affair; still its position in our vicinity at Beckton, and other circumstances, rendered its acquisition by us a most desirable proceeding. I think I stated the same to you on the occasion that I met you here, when we required your sanction for going on with the bill. It is a small concern, but it is situated in a very large district, as yet, certainly, not over thickly populated, but a district which, in the course of a few years, will become a very populous one, as it is now being covered with houses and is increasing day by day. Even as it is, that little company, by good management, and notwithstanding the difficulties it has had to contend with, from the expenses always attendant upon the management of small gas-works, has been able to return to the proprietors a very satisfactory dividend. Its rental is increasing half year by half year. In the last half year I believe there was an increase of something like 22 per cent. in the rental, and the dividend which the company will be able for the last time in its history to declare will be a very respectable one. Gentlemen, while we were in Parliament for the purpose of obtaining authority to purchase those works, we took the opportunity to secure the insertion in our bill of certain clauses which give us additional powers, which I think will turn out very advantageous for this company. We have frequently in the past laboured under some difficulty—with reference to public-houses particularly—in getting our gas-rental paid; but we have got a clause in this Act by which our gas-rents are payable by occupiers who are servants, which rental they may recover from their employers. On several occasions (I speak for the Chartered Company) we have sustained very heavy losses by these payments being shirked, and this clause in our new Act will give us greatly increased facilities in collecting our rental. We have also obtained another very important power, which is that on giving three months notice we can discontinue the supply of cannel gas in our district, and substitute common coal gas in its place. Now this question is a very large one, and a very interesting one to people in this part of London. It has not as yet come under the consideration of the board, and, of course, we should not think of making such a change at the beginning of the winter season; but we have gone so far that we have referred the matter for report to our worthy secretary, and our chief engineer, Mr. Evans, who will give us their views thereon, and if they think it will be for the advantage of the company, and the court coincides in that opinion, we shall not hesitate to make the change. It involves very large matters, such as a change of services, and resolves itself into a question of £ *s. d.* as to the revenue which will be produced from the one source of supply or the other. The fact is that under the new Act of Parliament the relations between the common gas and cannel gas are completely changed. Formerly—*i.e.*, a few years ago—we used to give a supply of cannel gas having an illuminating power of 20 candles. Now we are under obligations to furnish common coal gas of a minimum illuminating power of 16 candles, and to maintain that minimum we must supply our customers with gas of an average illuminating power of certainly 17 or 18 candles. The difference, therefore, between the common coal gas of the present day and the cannel gas of a year or two ago is very insignificant. These questions will be seriously considered by the court of directors, and I think you may safely depend upon it that whatever seems most remunerative to the company will be adopted by them. Now, gentlemen, as to the Beckton works. I dare say you will many of you be anxious to know in what position they are at present, and when we are likely to commence manufacturing gas there. From a very recent examination of those works—for I was down there the whole of last Wednesday—I can safely assure you that within about six weeks from the present time we shall be making gas at Beckton. Now, gentlemen, remembering that these vast works have up to the present date cost the company £478,800, you may judge of their magnitude; and, taking that fact into consideration, I think you must be satisfied with the progress that has been made. I will ask the secretary, as explanatory of the position of these works, to read a few extracts from the last report of our engineer-in-chief, which was delivered to the directors yesterday.

The SECRETARY read the following report:—

BECKTON WORKS.

ENGINEER'S REPORT. *Oct. 5*, 1870.

To the Court of Directors.

Gentlemen,—I have great pleasure in reporting that the works generally are so far advanced that I see no reason why gas should not be made during this month. The tanks and gasholders are nearly ready to receive gas; two of the gasholders have been proved, and are quite satisfactory; the other two are ready for testing. All the connexions on the works are nearly complete, and another week will see them quite so. The laying of the gas and water mains about the works, for the general supply of gas and water, has made considerable progress since my last report. To-day one of the exhausters was tested and worked for a considerable time, with very satisfactory results. I had hoped to have some of the steam cranes at work on the pier, but Messrs. Easton and Amos were not quite ready with certain alterations deemed necessary at the trial made last Wednesday. I have no doubt they will all be ready for use by next week, and as one of the locomotives and a supply of coal waggons will have arrived by that time, I trust confidently that in less than a fortnight we shall be able to unload a steamer. The testing of one of the tubes in the bridge over the river Lea commenced to-day, and, from what I can judge, a good job will be effected, and the connexion with the trunk main will be completed next week. The works at the bridge at the Poplar station of the North London Railway are making rapid progress, and by the end of the month will, I trust, be completed. The entire length of main from Beckton will then be ensured, and, as the connexions with the works at Brick Lane will by that time be completed, a supply of gas will be given to the district. Therefore, unless something very unforeseen occurs, I think we may confidently predict that, by the beginning or middle of November, we shall be making gas at Beckton very largely. I need hardly point out to you (as you have so constantly attended the works, and witnessed the great energy and exertions displayed by the contractors, and every one acting under your orders) the vast amount of work that has been done at these works since their commencement, practically only one year and nine months, for nothing was really done until the beginning of the year 1869, and it is little more than two years since our Act for the construction of the works was obtained, and in this period the large amount of engineering done is remarkable, embracing as it does nearly every branch of the engineering profession, and requiring a very great number of drawings, specifications, and estimates, all of which had to be prepared before the tenders for the works could be obtained, and copies given to the contractors. And notwithstanding the great, and in some cases unforeseen difficulties that have arisen in the foundations, in consequence of the bad nature of the ground, all obstacles have been overcome, and the works may now be considered capable of making gas at least nine months earlier than was predicted.

(Signed) F. J. EVANS.

The CHAIRMAN: I think, gentlemen, that this report must be highly satisfactory to you as it is to the board of directors. I do not believe that greater ends could have been achieved within the time, and I feel that the highest credit is due to all parties connected with the construction of these works. The design of these vast works at Beckton, which some of you may not have seen, is the sole conception of our engineer-in-chief, Mr. Evans, and I think every one who has visited them—and they have been visited by scientific persons from all parts of the country—will agree that they reflect the greatest honour on his talent and ability. We have entered into an arrangement with the Post-Office Telegraphic Department for establishing telegraphic communication between all our stations, including the Beckton works; so that we shall be in a position by-and-by to transmit messages from one station to another, from which, in a case of emergency, such as a sudden fog, we shall reap great advantage. We pay for this communication a small sum, something like £225 per annum. I am sure, also, the proprietors will consider that we have done a very good thing in acquiring for this company the introduction of the railway system into our works at Beckton. We have come to an arrangement with the Great Eastern Railway to connect the whole of their system with those works, which will give us the advantage, not only of getting inland coal with facility, and thus raise competition with the sea-borne coal, but will give us a very good outlet for our coke to inland markets and to the markets of London at a very inconsiderable expense. The report alludes to the slightly increased price of coal, and that is a matter which you are well aware is not under the control of the board. We make our contracts as low as we possibly can; but it so happens that for next year our contracts are, in a small degree, in excess of those of previous years. But I have no doubt that, as stated in the report, from the great facilities we shall enjoy at Beckton for the landing of our coal, and from the saving of freight and lighterage, we shall be more than compensated for this increase. I will tell you roughly what we expect to be the saving at Beckton, as compared with our different stations. As compared with the Westminster station, we shall have a saving of 3*s.* per ton; as compared with Brick Lane station, a saving of 4*s.* 1*d.* per ton; as compared with Curtain Road, a saving of 2*s.* 3*d.* per ton; as compared with Blackfriars, a saving of 2*s.* 2*d.* per ton; and as compared with Bow Common, a saving of 2*s.* 2½*d.* per ton. These savings are arrived at upon the lighterage, and upon the smaller amount of freight paid for our coals, and, upon our present consumption of coal only, they will amount to no less than about £38,000 per annum, a sum quite sufficient to pay a moderate return upon the increased capital we have been obliged to raise; and this is not taking into account at all the other savings which will be effected in labour in that great establishment at Beckton. Gentlemen, I do not think I need detain you any further. I have gone pretty minutely into all the details of our management during the half year, and I now beg to move—"That this meeting do agree with and confirm the report of the directors, and the auditors report and statements of account so transmitted."

Mr. GRAY: My worthy friend, the chairman, in addressing you, has alluded to the absence of our excellent and esteemed governor on this occasion. In that expression of regret we all concur. I will not trespass upon the time of the meeting by enlarging upon the merits of Mr. Beck; they are known to us all, particularly so to myself. Gentlemen, I do most heartily congratulate you upon the position of the amalgamated companies. If I ever entertained any doubt as to the propriety of that measure, I am now perfectly satisfied that arising out of it there is a bright day for us all. Of course the diminished expenses will facilitate that object, and I have no hesitation in predicting that by an increased rental we shall be in a position at no distant day not only to pay you the 10 per cent. dividend to which you are entitled, but also to make a reduction in the price of gas to the public. You may easily imagine that those who have the direction of such great undertakings as these have a deep interest in doing all in their power to conciliate those to whom they supply gas. In my opinion the amalgamation with the Great Central Company was one of the best things done for many years past. That amalgamation, like the amalgamation with the City Company, was sanctioned by you, and I rejoice to be able to state that there is a spirit of harmony prevalent amongst us which will ensure success in our undertaking. You may rest assured that we shall do all in our power to deserve the confidence you have reposed in us.

Alderman DAKIN (Lord Mayor elect): Mr. Chairman and gentlemen, I will only add a few words to those which have been so well spoken by my predecessors. As the late chairman of the Great Central Gas Company I am bound to endorse, most emphatically, the opinion expressed by them as to the result of the amalgamation. I believe it will be good for the companies, and it will be likewise advantageous for the public. I believe that the concentration of administration so accomplished will work out for the advantage of all concerned. We were not at the first very eager adherents of that doctrine, but the Board of Trade took a large view of the question, which was thus put forward after consideration by a committee of the House of Commons, and I believe they will turn out to be right. At any rate I wish to say, as has been already said, that with regard to the unions of the boards most decidedly we all work with the greatest harmony, and that though in past times there may have been some little competition between us, and some of that eagerness which springs from competition, we are now united in the common service of the public, and we feel great pleasure in meeting together to accomplish the great object we have in view, both for the interests of our consumers as well as the proprietors.

Mr. PHILLIPS said the chairman had stated the difference between cannel and common coal gas with reference to the illuminating power, but he had not stated the difference in price.

The CHAIRMAN said the present price of cannel gas was 5*s.* 5*d.* per 1000 cubic feet, and its illuminating power 23 candles. The company had the option of reducing the illuminating power and the price, but upon going into the question the board found it most advantageous to maintain those figures. For common gas they were limited to a price of 3*s.* 9*d.* per 1000.

A SHAREHOLDER said it might be that others present, as well as himself, were but little acquainted with the provisions of the company's Act, and therefore he felt justified in asking whether, in addition to paying 10 per cent., if the profits allowed, the directors would be entitled to pay the income-tax on dividends. He would also ask whether, if in any one year 10 per cent. was not realized, the deficiency could be made up from the profits of future years.

The CHAIRMAN said he must answer both questions in the negative. The company were not allowed to pay more than 10 per cent., and from that they were bound to deduct the income-tax. If there was a surplus profit after paying the maximum dividend, they were entitled to apportion it to a reserve-fund until that fund amounted to 10 per cent. of the subscribed capital.

The motion was then put, and carried unanimously.

On the motion of the CHAIRMAN, seconded by Mr. GRAY, it was resolved—"That a dividend at the rate of 9 per cent. per annum for the half year ending June 30 last be now declared."

Mr. WOOLLASTON said he rose to propose a resolution which he thought would meet with the ready concurrence of the shareholders. Since the amalgamation of the three companies, the room in which the present meeting was held had been ornamented with the portrait of Mr. Gray, the respected chairman of the City Company. He thought it would be a fitting compliment to pay to Mr. Beck, the governor of the Chartered Company at the time of the amalgamation, if the proprietors requested him also to sit for his portrait. He had pleasure, therefore, in moving—"That a portrait of Simon Adams Beck, Esq., the governor, be painted at the expense of the proprietors, and placed in the board-room of the company."

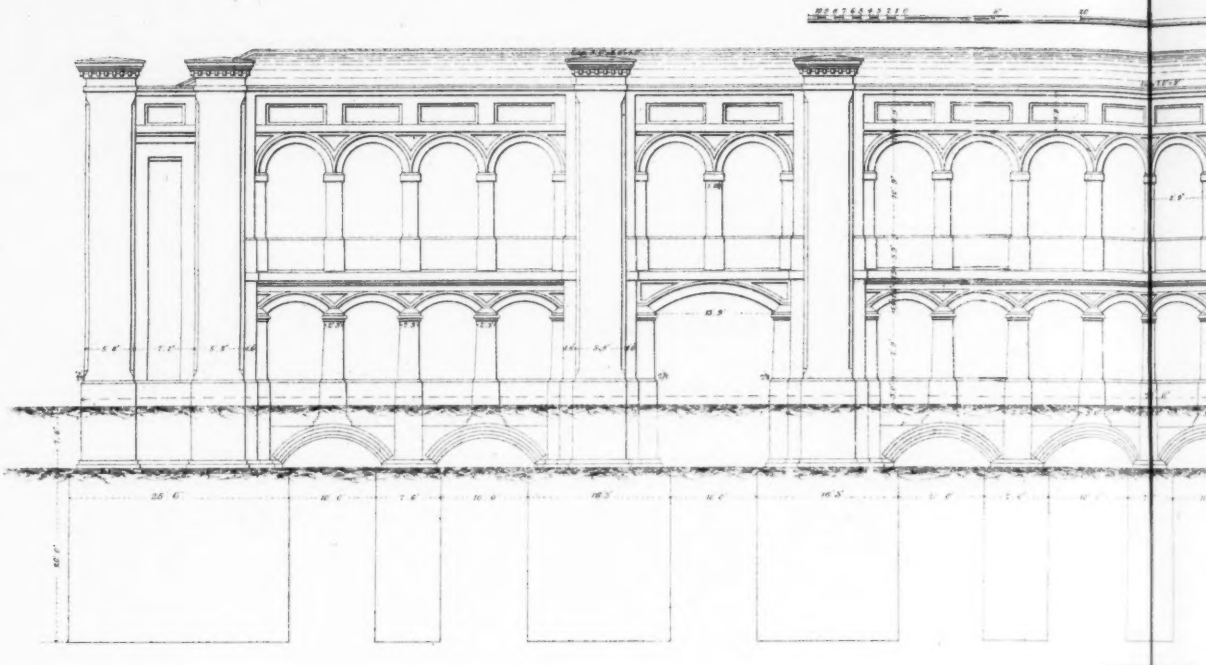
Mr. GRAY seconded the resolution, and said it would be very gratifying to his feelings to know that his own portrait hung by the side of Mr. Beck's.

The CHAIRMAN, in putting the motion, said he thought it would be hardly necessary for him to assure the meeting that the suggestion made by Mr. Woollaston, one of the largest and oldest shareholders in the company, had his most cordial concurrence. Indeed, there could not be a dissentient voice to it. No one could

CHARTERED GAS

BECKTON WORKS

PURIFYING HOUSE



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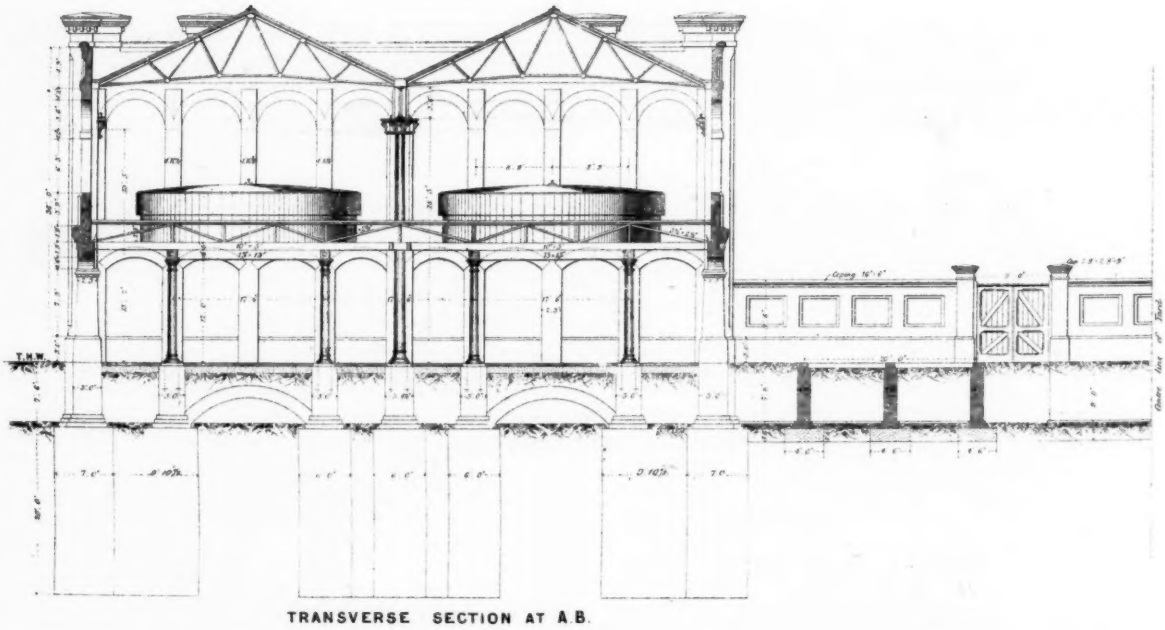

TRANSVERSE SECTION AT A.B.

Photo-Lithographed by Whiteman & Bas

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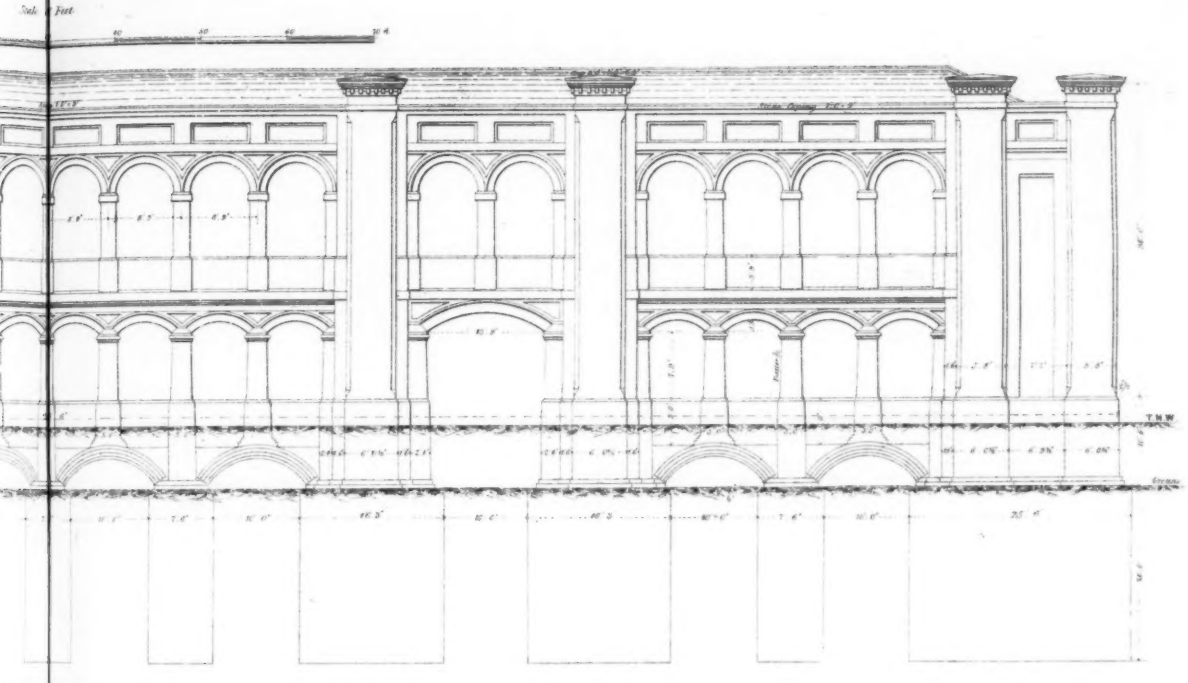
D GAS COMPANY.

KTON WORKS.

FYING HOUSE



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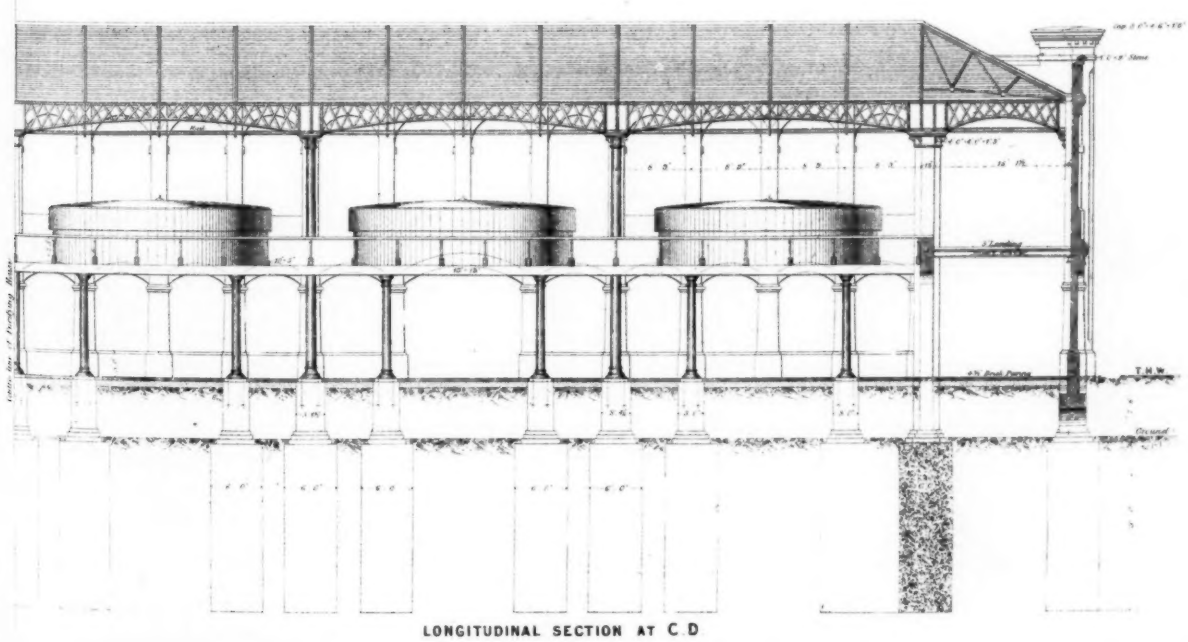

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by Whiteman & Bass London

put his hand upon a single instance in which Mr. Beck had failed in his duty to the company, or withheld his best energies when the interests of the company were at stake. He might call in evidence the great pains taken by Mr. Beck in carrying out the districting arrangements of the metropolis—arrangements which had since obtained the sanction of Parliament, and the importance of which nothing could exceed. Ever since those arrangements were made—and Mr. Beck was the principal mover in them—everything had conduced to the prosperity of the companies. As far as the directors were concerned, he thought he might truly say that they had always acted with Mr. Beck more as a brother than otherwise. His affability and kindness of manner, his genial disposition and businesslike habits had endeared him to every member of the board; and, therefore, it was with great pleasure that he (the chairman) submitted the present motion to the meeting.

The resolution was put, and carried unanimously.

Mr. GRAY called the attention of the shareholders to the fact that in the person of Alderman Dakin the board were honoured with the able counsels of the Lord Mayor elect. He thought there would be a want of completeness in the act which the meeting had just performed if they did not supplement it with a request that the late chairman of the Great Central Company would consent to sit for his portrait, so that the board-room of the company might be ornamented with representatives of each of the amalgamated companies.

The CHAIRMAN seconded the resolution, which was put and carried unanimously.

Alderman DAKIN appropriately acknowledged the compliment paid to him.

On the motion of Mr. WOOLLASTON, seconded by Mr. BARCLAY F. WATSON, a cordial vote of thanks was given to the directors for their services.

The CHAIRMAN acknowledged the vote, and the proceedings terminated.

PHŒNIX GASLIGHT AND COKE COMPANY.

The Adjourned Half-Yearly Meeting of Proprietors of this Company was held at the Bridge House Hotel, Southwark, on Wednesday, Sept. 28—EDWARD HORNER, Esq., in the chair.

The SECRETARY (Mr. I. A. Crookenden) having read the notice convening the meeting, and the minutes of the last general and *pro formâ* meetings, the following report and statements of account were presented:—

The directors submit herewith the trade account and balance-sheet to the 30th of June last.

The rental for the half year is but slightly in excess of the corresponding period of last year; but, considering that the price of gas has been reduced 3d. per 1000 feet throughout the district, for the quarter ending June 30, this result is not regarded as unfavourable.

Two of the gasholders at Wellington Street are being thoroughly renewed, and are nearly completed; and an additional station-meter is in course of construction, to be fixed at Kennington Lane.

The net amount of profit on the half year's trading is £42,134 9s., which, added to the undivided balance of £17,136 9s. 10d. (after paying dividends in April last), makes a total of £59,270 18s. 10d. to the credit of profit and loss, as per that account; out of which your directors recommend that dividends be declared as follows:—

On the £20 divided shares, 10 per cent. per annum.
" New stock, 7½ ditto.
" Capitalized stock, 5 ditto.

Less income-tax, leaving an undivided balance of £23,270 18s. 10d.

Abstract of the Trade Account, Half Year to June 30, 1870.

Dr.		*Cr.*	
To Coals used	£39,227 18 5	By Rental	£98,733 11 11
Materials supplied	10,028 6 3	Coke	18,118 7 1
Law expenses	26 17 2	Breeze	214 19 6
Meters—repairs and renewals	1,529 6 6	Tar	3,451 14 9
Rates	2,680 9 8	Ammonia	1,386 12 0
Insurance	24 18 9	Rents	1,619 18 0
Directors, £1000; auditors, £50	1,050 0 0	Miscellaneous receipts	173 9 5
Salaries	5,495 4 10	Interest	13 8 8
Wages	16,533 12 9		
Bad debts and allowances	983 17 4		
Interest on bonds	2,882 8 0		
Leasehold-fund	430 0 0		
Rents	431 8 0		
Interest	253 4 8		
Net profit	42,134 9 0		
	£123,712 1 4		£123,712 1 4

Profit and Loss.

April 6, 1870.—To dividend for half year ended December 31, 1869	£35,550 0 0	January, 1870.—By balance brought forward	£32,686 9 10
June 30, 1870.—To balance carried forward	59,270 18 10	June 30, 1870.—By half year's profit	42,134 9 0
	£94,820 18 10		£94,820 18 10
		July 1, 1870.—Balance brought down	£59,270 18 10

Abstract of the Balance-Sheet, June 30, 1870.

Dr.			*Cr.*		
To Capital of 27,000 £20 shares, paid in full (maximum dividend 10 per cent.)		£540,000 0 0	By Amount of plant on Dec. 31 last		£883,193 6 7
Capitalized stock, paid in full (maximum dividend 5 per cent.)		144,000 0 0	Expended this half year for extension of works		4,540 16 0
New stock, £360,000, £40 per cent. paid up (maximum dividend 7½ per cent.)		144,000 0 0			£887,734 2 7
Bonds, at 5 per cent.		115,296 0 0	Investment of leasehold-fund		14,164 7 9
Unpaid dividends		119 4 3	Amount due for rental—		
Ditto tradesmen's bills, &c.		15,042 5 10	Midsummer quarter	£34,289 0 1	
Leasehold-fund		14,164 7 9	Arrears	2,985 13 7	
Balance of profit and loss—					37,274 13 8
Undivided balance	£17,136 9 10		Amount due for coke	£4,389 4 11	
Half year's profit	42,134 9 0		Ditto breeze	71 5 9	
		59,270 18 10	Ditto tar	2,521 7 0	
			Ditto ammonia	519 13 2	
			Ditto sundries	2,243 8 6	
					9,744 19 4
			Stock of coals	£8,312 10 0	
			Ditto coke	41 12 0	
			Ditto breeze	13 4 0	
			Ditto tar	565 13 0	
			Ditto ammonia	116 14 7	
			Ditto retorts	901 10 6	
					9,951 4 1
			Ditto of meters at Christmas last	£37,914 8 5	
			Additional meters	1,742 15 0	
					39,657 3 5
			Cash on deposit		20,000 0 0
			Balance at treasurer's		13,366 5 10
		£1,031,892 16 8			£1,031,892 16 8

"Audited."

(Signed) RICHARD DOWNS, CHARLES MORTIMER, Jun., } *Auditors.*

The CHAIRMAN: Gentlemen, I will now proceed, if you please, to move—"That the report and accounts be received and entered on the minutes." I am happy to say that the report and accounts speak so well for themselves, that it is hardly necessary I should detain you long in attempting to offer any explanations respecting them. During the last half year we had the same benefit which we enjoyed in some previous half years of a reduced price of coals, which, of course, is the life and soul of gas-makers. And notwithstanding that reduced price, we were equally fortunate in the circumstance that our residual products maintained their value at a rate more than proportionate. In the item of coke especially we were able to obtain a price higher than we have been accustomed to, when the cost of coal has been considerably greater. So that you see we have been gaining at both ends, instead of, as sometimes has been the case, losing at both ends. We can only hope that such a state of things may continue. No doubt the increased value of our residual products is mainly owing to the improved condition of trade on the south side of the river. For a long time after the great panic of 1866, trade was so prostrated in our district that the consumption of coke in some of the large manufactories was reduced almost to nothing. Latterly the business of these manufactories has revived, and we are consequently feeling the benefit of it. The cost of "Materials supplied" during the last half year was £980 more than before, but that has in a great measure arisen from the circumstance that we have thought it right, while we are in a prosperous state, to keep all our works and plant in the most perfect order and repair. We have done much to our gasholders, and our apparatus generally was never in so complete a state. We had a great many old gasholders at the Wellington Street station which were useless. These have all been repaired, and are now in operation. In fact, every gasholder we possess is now in use, and our capacity for an increased business is greater than it ever was before. The accounts now laid before you are very similar in all respects to those which we presented last half year. The principal item in which there is an increase is that of "Wages," which is larger by £956; but the greater part of that increase arises from the circumstance that there was an extra week in last half year, which accounts for £700 out of the £956, so that really the variation is very little. The total increase of expense in the carrying on of the trade for the half year is £2530, while we have reduced the other expenses by £1583, so that really our total increase is only £947, which, when you look at the amount of our expenditure, generally about £120,000, is really a very small sum. On the other side of the account, while we have used rather less coal, we have an increase in our rental of £1441. Coke has increased £505, mainly, of course, from the very good price we have received for it, and our residual products are £400 more. There has, therefore, been a total increase in the receipts on these items of nearly £2350, which I think may be considered satisfactory. In the other items there has been a falling off of £223, which is excessively trivial. You will perceive that the balance of "Net profit" is £1180 more than for the corresponding half of last year, and when you consider that we have reduced the price of gas 3d. per 1000 cubic feet, of which one quarter came into this half year, I think you will agree with me that we do not present a very bad state of affairs to the proprietors to-day. Of course, the next half year will not show so well, for we have a winter quarter which will affect us more. Still, the margin of profit we retain after payment of the dividends on this occasion is sufficient to ensure the payment of a like dividend when we shall have the pleasure to meet you again. I think you will all agree that the sum of £23,270 which will be left over is not only a great guarantee for your next dividend, but tends to make your property exceedingly secure by the provision it affords against any misfortune or accident which may happen to us. The quantity of gas made per ton of coal during the last half year was very favourable. I will not state the amount of waste, it was so extremely small—so much less than it has been before, that if I mentioned it, it might be asked, on some future occasion, should the present rate be exceeded, how it was we could not maintain the minimum. I will simply say that it has been considerably less than before, and then it was only 13 per cent. I do not suppose the Metropolitan Board, or any other public body, could show a better state of things if the manufacture of gas were transferred to their hands. The illuminating power of our gas, according to the old test, has averaged 14½ candles, which, according to the new test, as used in the City of London, would be between 15 and 16; so that we have been giving our consumers 25 to 30 per cent. better light than we are called upon to do by Act of Parliament, while we have been reducing the price 3d. per 1000 cubic feet. Our desire has been to supply gas on terms as advantageous as any company can do. We know what the city companies on

the other side of the river are required to do, and, without any undue rivalry, we do not intend to be behind them, although there is no legislative compulsion upon us. As I said before, the accounts are so similar to those last presented that I do not see how I could consult your interests were I to detain you longer by referring to them. I shall therefore move at once—"That the report and accounts be received, and entered on the minutes."

Mr. GRAY, in seconding the motion, said: I think the proprietors now present must be highly gratified at the statement which the chairman has just made. I have no doubt that with the continuance of the present judicious management of our affairs, we shall have as good a statement of accounts at our next meeting as we have had on this occasion. I quite agree with my honourable friend that companies like ours ought to do all in their power to meet the reasonable requirements of the public. But not unfrequently the public ask more than is fair and reasonable, and are not content with those concessions which, having regard to the interests of their constituents, the directors are enabled to make. I am quite sure, however, of one thing, that so long as my worthy friend presides over the management of the affairs of the Phœnix Company, and is so ably supported by his colleagues, they will be prepared to meet every equitable demand made upon them. The state of this company is prosperous beyond expectation, and this prosperity is in a great measure attributable to the judicious way in which the business has been conducted. The dividend to be declared to-day is at the rate of 10 per cent., and there will be a very large balance in reserve, amply sufficient to meet any contingencies to which the company may be subject; but with such able management, and such good officers as we are fortunate in possessing, I do not apprehend anything of the sort. I trust this company, with others in the metropolis, may continue to enjoy the comparative quiet and peace we have enjoyed of late. It appears to me that the amalgamation of the several companies in the City will give security to other companies in the vicinity. I gave my consent to that amalgamation with great reluctance, but it was inevitable on my part. I am pleased to state that hitherto we have found it work very advantageously to all parties concerned, and I have no doubt we shall continue to enjoy prosperity, unless unforeseen events arise to prevent it. There is one thing which contributes to our security—viz., that though we have been compelled to reduce the price of gas to 3s. 9d. per 1000 cubic feet, we can, should a rise take place in the cost of coal, go to the Board of Trade and ask for a revision of price, so as to ensure to our shareholders their dividend of 10 per cent. That is a great security to the gas companies, and is not an unreasonable thing as regards the public, for no one can tell what the cost of the raw material may be in the event of a war. Gentlemen, I compliment you and the directors who have given us so good an account to-day, and I have very much pleasure in seconding the motion.

A SHAREHOLDER, referring to the item of "Bad debts and allowances," said he thought the amount was rather large.

The CHAIRMAN said it must not be supposed that the whole £983 consisted of bad debts. It included allowances on the arrangements of meter accounts, and the interest allowed by the company on deposits. The bad debts formed a comparatively small part of the sum. It was recently stated at one of the meetings that the bad debts of the company were not more than 12s. 6d. per cent.

Mr. MORTIMER said he thought that with so large a balance in hand the directors might on future occasions pay the dividends a little earlier.

The CHAIRMAN said that was a matter which must be left to the board. He, for one, should be very glad to get his dividend as soon as possible, but, as every person connected with gas companies knew, a certain time must elapse after the accounts were sent out before the rental could be received. If the shareholders did not mind the directors borrowing from their bankers for the purpose of dividend, they could pay it, of course, much earlier; but the board felt it their duty to conduct the business as economically as possible.

Mr. GRAY remarked that, with one exception, the dividends in this company were paid earlier than in other metropolitan companies.

The CHAIRMAN said this was the first occasion for many years on which they had been enabled to pay the dividends entirely out of funds in hand, and without borrowing anything from the bankers.

The motion was then put, and carried unanimously.

The DEPUTY-CHAIRMAN (Mr. Shand) moved—"That dividends for the half year ending the 30th of June last be and the same are hereby declared and made payable out of the profits of the undertaking at the following rates—viz., at and after the rate of 10 per cent. per annum on the original shares of the company; at and after the rate of 5 per cent. on the capitalized stock; and at and after the rate of £7 10s. per cent. upon the amount paid up on the new stock of the company; deducting income-tax on each of the above. That such dividends be payable to the bankers of the proprietors so ordering it, and that the remaining dividends be forwarded by post."

Mr. GIBBES seconded the motion, which was carried *nem. con.*

The CHAIRMAN: Now I have to ask your sanction to a little alteration in the mode of closing our books. A great deal of fault has been found with us for closing our books on the 30th of June in each year, the consequence being that for three months after the dividend is to be paid our shares are not marketable with the dividend, which has given rise, in some cases, to inconvenience. We find it is customary with railway and other companies to close their books for three weeks previously to the actual payment of dividend, and we want your sanction to enable us to do the same. I therefore propose that in future the transfer-books of the company be closed for three weeks before the meeting at which dividends are declared.

Mr. MORTIMER seconded the resolution, which was put and carried.

On the motion of Mr. GRAY, a cordial vote of thanks was given to the directors for their careful attention to the business of the company.

The CHAIRMAN: Mr. Gray and gentlemen, on behalf of the directors generally and for myself, I beg to thank you for the motion you have just passed approving of our exertions in the past half year. I can only say we are all partners in the same concern; your directors hold a not inconsiderable stake in the company, but, apart from their desire to benefit themselves, they always have the interest of the general body of shareholders at heart. When I first became a director of this company the capital was only about one-third of its present amount, and when I remember that the capital is now something like £1,000,000, I cannot but regard it as a concern of great magnitude, and feel greatly impressed with the vast responsibility cast upon us. However, I assure you we have, as I believe you give us credit for doing, devoted ourselves to promote your best interests, and at the same time to show the public that we never lose sight of their just and equitable claims. I am much obliged to you, gentlemen, for your attendance to-day.

PROGRESS OF GAS LIGHTING IN AUSTRALIA.—The City of Melbourne Gas and Coke Company are now making considerable additions to their works, in order to meet the largely increasing demands for gas consequent on the rapid growth of the population of Melbourne, and have recently procured from this country the ironwork for a retort-house capable of containing 120 retorts, besides providing for the storeage of a considerable quantity of coal. The clay retorts and fire-bricks for the settings, together with all the ironwork, have also been obtained from this country. A station-meter to pass 50,000 cubic feet of gas per hour is about to be sent out, and the company have, within the last two years, added to their works a telescopic gasholder, to contain about half a million cubic feet of gas, a set of purifiers, and two Beale's exhausters. A set of photometrical and testing apparatus having been lately forwarded to the company is an indication that they desire to keep pace with the times, in regard to the illuminating power and the purity of the gas supplied by them to the public of Melbourne.

THE WOOLWICH LOCAL BOARD AND THE GOVERNMENT GAS-WORKS.

At the Meeting of the Board on Tuesday, Sept. 27—Mr. JACKSON in the chair—a letter was received from the contractor for laying down mains and pipes for the supply of gas to the Marine Barracks and Infirmary from the works in the Arsenal.

Mr. HUDSON then brought forward a motion of which he had given notice, requiring, before permission was given for opening grounds for this purpose, that an agreement should be entered into by the Government to pay an annual sum of £112 as compensation for such permission.

Captain BEHENNA deprecated the passing of such resolution, feeling that it would be received as hostile by the Government, and the effect would only be a short delay until next session of Parliament, when a bill would be passed by which the Government would be given the power they now claimed.

Mr. RUEGG suggested that a deputation should wait upon Sir Henry Storks, to explain the feeling of the board, laying down the principle that rates be paid on the proposed gas-works, and mains and pipes, the same as by gas companies.

The CHAIRMAN said Government would not recognize payment of money as rates, though they might consent to pay money as compensation.

Captain BEHENNA said that, rather than appear hostile to the Government, he thought permission ought to be given to open the ground, and the question of compensation be settled afterwards, he being of opinion that some such payment should be made to the parish.

Some further discussion ensued, in which Mr. HUDSON agreed to the altering of the word "rates" into "rent," arguing that the Government would effect a saving of 25 per cent. on £150, and that the payment of the sum asked for should be made for interfering with the freehold of the parish, and that it was the duty of the board to treat the War Department in the same manner as they would treat a public company.

Mr. RIXON seconded the motion.

Mr. RUEGG moved that the consideration of the question be postponed until after a deputation had waited on Sir Henry Storks.

Mr. WHALE seconded the amendment, and on a show of hands being taken, five voted for the amendment and four for the original motion.

The amendment was then put as a substantive motion, with the same result.

At the Woolwich Police Court, on Monday, Oct. 3, *Charles Gillham*, of Landport, contractor to the War Department; *Frances Hair*, Sergeant-Major Royal Engineers; *George Coles*, contractor's foreman; *James Windebank*, 4, King Street, Woolwich; *John Hawes*, 41, Warwick Street; *James Pennell*, 60, St. Mary Street; *John Marsh*, 3, Bowater Crescent, and *Charles Provis*, 13, Hardin Street, Woolwich, were summoned by the Woolwich Local Board of Health for breaking up and displacing the roadway in Frances Street.

Mr. FARNFIELD, solicitor to the Local Board of Health, appeared to prosecute, and Mr. CLULOW, solicitor to the War Department, defended.

Colonel Gosset, and other officers of the Royal Engineers, and Messrs. Hudson and Taylor, members of the local board, and others interested in the case, were present.

Mr. FARNFIELD having briefly stated the facts of the case,

John Barnett, surveyor to the local board, said that he received a notice from the contractor that he wished to open the road in Frances Street, on Wednesday last, under a contract with the War Department. To this a reply was sent, stating that the road must not be broken without special authority from the board. On Wednesday morning witness found that the defendants had opened the road, and he cautioned them that they were doing an illegal act, by which they were liable to a penalty of £5, and 5s for every square foot of ground disturbed. They, however, persisted, and were continuing he believed until now.

Mr. *A. T. Raynes*, assistant clerk to the board, was called to proved sending the reply to the contractor, and in answer to Mr. Clulow said that he know of a letter having been previously received from Colonel Gosset, Commanding Royal Engineer, but that was merely a notice, and the Government representatives themselves would not admit that it was an application.

Mr. CLULOW said the answer to the case was that the act was the act of the Crown, which was not subject to such obligations, and that, the matter being urgent, the Crown had given orders to have the work proceeded with.

Mr. FARNFIELD said the matter was not urgent, for the War Department was under a contract with one of the local companies for a supply of gas to the Royal Marine Barracks until the end of the year. He had, on information of the road being opened, written to the Commanding Royal Engineer, requesting that the works might be suspended until the magistrate's decision had been given, but this had not been complied with. The court ought also to know that the local board had, in the hope of avoiding a conflict with the Government, written to Sir Henry Storks, Surveyor-General, on the subject of rating the Government gas-works and mains, and had been promised an interview.

Mr. CLULOW said the rates were the sole object of the board, who sought thus to obtain from the Secretary of State what he had no power to grant. He contended, however, that the public road was the Queen's highway, and that the Queen could stop it up or do as she pleased with it for public purposes. True, the highways were vested in the local board, but that was only for certain purposes, the rights of the Crown being in all cases reserved.

After some argument between the legal gentlemen,

The MAGISTRATE (Mr. Maude) said the question was one of supreme importance, and being in great doubt as to the law of the case, he could not undertake to give a decision. It was not alleged that the works had caused any actual damage or inconvenience, and he could not favour this mode of proceeding, because a naked right had been used by the board to enforce an indirect and collateral issue. He felt strongly the injury done to places like Woolwich by the refusal of the Government to pay rates, but he could not admit the right of the local authorities to use a technical power as a lever to obtain an advantage in another direction. He had no objection to granting an adjournment, and Mr. Farnfield might if he thought fit take a case for a higher court, but independent of the doubt which existed as to the law, he thought it would be more clear and direct for the board to proceed by an injunction to restrain the Government from proceeding with these works, rather than by alleging damages when there was actually no damage done. The board could not hope to gain its end by such opposition to the Government as this, for the Government could apply for a *mandamus* to compel the board's consent, and, unless the board could show that there was reason to believe the road would be left in an improper state, they would have no answer to give. His opinion was that the defendants were acting as servants of the Crown, and he had a strong opinion also that the Crown was exempt from the local provisions. The case might stand open until Monday, in order that some arrangement might be made, but it appeared to him that he had no authority to interfere.

THE WATER SUPPLY OF EDINBURGH.—The Edinburgh Water Trustees have issued a statement to the effect that in consequence of the prolonged drought the whole of the reservoirs of the trust are empty, and that the supply of water for the city is entirely dependent upon the springs on the north side of the Pentlands. The trustees "earnestly appeal to the community to exercise the most rigid economy in the use of the water, and to dispense, as far as possible, with baths during the present scarcity." At a meeting of the Finance Committee of the trust, held on Thursday, it was stated that the supply of water from the springs would still be at the rate of 16 gallons per head per day for a population of 210,000.

COMMERCIAL GAS COMPANY.

The Ordinary Half-Yearly Meeting of the Proprietors of this Company was held at the London Tavern on the 7th inst.—JAMES HOLBERT WILSON, Esq. (deputy-chairman) in the chair.

The CHAIRMAN said: Gentlemen, our chairman, Mr. Butler, is not well enough to be able to resume his seat at this meeting, but I am happy to say he is better than he was on the last occasion, and we hope to have him amongst us shortly.

The SECRETARY (Mr. Jaques) having read the advertisement convening the meeting, and the minutes of the last half-yearly meeting, the corporate seal was affixed to the register of proprietors.

The following report and statement of accounts was then presented:—

The directors report that, during the half year ending the 30th of June last, a net profit of £26,176 10s. 1d. has been realized, and they recommend that a dividend of £5 per cent. for the half year (less income-tax) be declared, leaving a balance of £4314 19s. 10d. to be added to the reserve-fund.

STATEMENT OF ACCOUNTS,

Showing the Actual State and Condition of the Concerns of the Commercial Gas Company, for the Six Months ending the 30th day of June, 1870.

I. CAPITAL.—*State of the Account at the End of the above Six Months.*

Statute, or Authority, under which raised.	Number of Shares.	Amount per Share.	Paid up per Share.	Total Paid up.	Total Capital.
Shares	17,486-2/5ths-1/10th-1/20th 3-4/5ths-1/10th	£25 0 0	£25 0 0 Various.	£437,163 15 0 66 10 0	£437,230 5 0
COMMERCIAL GAS ACT, 15 & 16 Victoria, cap. 155.	17,490-2/5ths 1/20th				

II. REVENUE.—*Account during the above Six Months.*

RECEIPT.			EXPENDITURE.		
Sale of gas—			Management—		
At 4s. per 1000 feet	£59,115 5 0		Directors allowances	£750 0 0	
Public lighting and contracts	7,661 7 1		Salaries of secretary and clerks	1,617 6 2	
	£66,776 12 1		Collectors commission and pay	851 17 2	
Sale of residual products—			Rent, rates, and taxes of offices	50 0 0	
Coke	£11,432 1 7		Stationery, printing, and general charges	600 1 6	
Breeze	32 6 11		Payment to auditors	75 0 0	
Tar	1,602 4 2			£3,944 4 10	
Ammoniacal liquid	877 10 8		Manufacture of gas—		
	13,944 3 4		Coals, including carriage, dues, &c.	£30,273 6 2	
Miscellaneous receipts	535 0 6		Purifying materials	1,120 9 3	
			Supervision and labour	10,549 15 10	
			Ordinary repair and maintenance of premises	4,665 18 0	
			Rents, rates, and taxes of manufactory	1,629 5 8	
				48,238 14 11	
			Distribution, including service-mains, pipes, &c.—		
			Ordinary repair and maintenance	1,938 11 11	
			Meters—		
			Restoring and replacing	957 14 2	
			Balance for shareholders profit	26,176 10 1	
	£81,255 15 11			£81,255 15 11	

Balance of shareholders profit as above	£26,176 10 1	
Required for dividend	21,861 10 3	
Balance to be invested in reserve-fund	£4,314 19 10	

Reserve-fund, £23,410 9s. 7d.; invested in £25,552 6s. 8d. Consols.

We have examined the above accounts, and certify them to be correct.

CHARLES S. BUTLER, *Chairman.*
GEORGE JAQUES, *Secretary.*

The CHAIRMAN: Gentlemen, just before I came into the room a friend on my right was praising the brevity of our report. It is a short report, and I will endeavour to imitate its brevity in the observations I am about to make. You will find, on looking over our report, that every line is of a satisfactory character—a thing which we can seldom affirm of reports of a much longer composition. There is, however, one point which needs a word from me. Although we have sufficient for your dividend at 10 per cent., we do not, as you will perceive, carry over quite so large an amount to our reserve-fund as we did on the last occasion. This is readily accounted for by the large repairs which we then stated would be necessary in our old retort-house, which had lasted over 30 years. I am happy to say those repairs are nearly completed, and the greater part of the work has been paid for. The operations of the whole half year have been of a satisfactory character. Our residual products have not yielded quite so much, perhaps, as they have done in former half years, but then you know we are very unfavourably placed for the sale of those products. The Great Central Gas Company has now amalgamated with the Chartered Company, and no doubt, in time, the carbonizing department will be conducted down at Beckton; and when the station at Brick Lane, belonging to the Chartered Company, is closed, no doubt we shall have a better sale for our residual products. With so many gas companies around us, we really, at many periods of the year, are making more than we can profitably dispose of; but we trust that will be cured to some extent by what I have just mentioned. Our gas has been of great purity and good illuminating quality during the past half year; in fact, it has been two candles above our parliamentary standard during the whole time. That is the bright side of the picture. There is a little cloud, perhaps, but only a slight one, on our prospects for the current half year, and that is, this terrible war, which is devastating the fair provinces of France, has increased the price of coal at the pit's mouth, and also, naturally, the price of freight. We are not, therefore, able to make such favourable contracts as we have done on former occasions. Our parochial rates have also very much increased. As you are aware, an Act was passed in 1869, under which a new assessment has been made of all the property in London. Under that assessment, I am sorry to say, our rateable value has been very much increased, and the great poverty existing in our eastern district will very likely necessitate high poor-rates. There is nothing, however, in all this to jeopardize your dividend; but it will account for our not having, perhaps, so much to carry over to our reserve-fund on another occasion as we have now. This, gentlemen, shows you how unwise it was to fix a rigid price for the manufactured article when every material entering into its composition is subject to change, and, generally speaking, to a change unfavourable to the company. It is positively necessary that there should be some surplus, in order that while the capital account is closed we may be able to effect the repairs that are required, and to meet those increased burdens which we are called upon to bear. There is nothing further that I need trouble you with, and having told you that the last half year is satisfactory, and that we do not feel much anxiety, further than I have named to you, for the future, I think I have told you that which will make you fully acquainted with our affairs, perfectly comfortable in your own minds, and go home and consider that you have an excellent investment. During all the year gas property has kept up its price. Our shares have recently been sold at £40 or £41; not so high a price as they have fetched in times gone by, but they have not varied at all as these foreign speculations have about which so much has been said in the papers. I now move—"That the report and accounts be received and adopted, and entered on our minutes."

A PROPRIETOR wished, without disturbing the equanimity of the meeting, to ask one question. Two meetings ago they were told that there was a defaulter in the company. He wished to know whether the surety paid up or not, or whether anything was done. They ought to know whether the money was got back again, and whether the sureties accepted by the board were any good or not.

The CHAIRMAN said he was sorry to say the sureties were not good for the whole of it. One of them being abroad, and the other insolvent, the board thought it desirable, under all the circumstances, to come to a compromise. A portion of the money was paid, but there was some loss, and that not a very small one.

The PROPRIETOR said the fact ought to appear in the accounts.

The CHAIRMAN said it was all written off in the same half year.

Mr. RHODES seconded the motion for the adoption of the report. He asked whether the inspectors who took the accounts of the quantity of gas consumed by private meters were also the company's collectors.

The CHAIRMAN: Certainly not.

Mr. RHODES said if the inspector was not the collector, when the collector went round to collect the amount so entered as charged on the consumer, had he power to alter that account on the ground that the register had been wrongly taken?

The CHAIRMAN said certainly not. It was obvious he had no power to do a thing of that kind. The case must be reported to the board, and the alteration made in the office, not by an individual going to a shop and saying the consumer was charged too much or too little.

Mr. RHODES said he put the question, not knowing what company it was, but he was informed that some company was doing it. The disavowal of any such practice on the part of the board would be a satisfaction to the public out of doors.

The CHAIRMAN said it must be understood that he was not interfering at all with the affairs of other companies. He thought the question referred entirely to their own company, and stated that it was not their practice. He was not saying anything as to other companies.

The motion was then put, and carried unanimously.

Mr. GOOLE inquired whether the board were satisfied as to the solvency of the sureties for their present collectors.

The CHAIRMAN said they were so. Their plan was to send round at the commencement of every year to inquire into the sufficiency and stability of the sureties. The next business was the declaration of a dividend; and he moved—"That, in pursuance of the recommendation of the board of directors, a dividend of 5 per cent. for the half year ending the 30th of June last, less income-tax, be declared, and that cheques be forwarded to the shareholders on Monday next."

The motion was put, and carried unanimously.

The CHAIRMAN having stated that the business of the meeting was concluded,

Mr. RHODES said one matter had pressed very much on his mind for some time past, and that was, the feeling that their directors were not so well remunerated for their services as directors in other companies. He should propose that £300 a year be added to their allowance.

A PROPRIETOR asked whether such a resolution could be put without notice having been given.

The CHAIRMAN said certainly not.

The PROPRIETOR said in that case it was a pity that Mr. Rhodes should waste a speech when it would come to nothing.

The CHAIRMAN said the board did not wish any addition to their allowance. Mr. Rhodes made his proposition without consulting them. The directors had been with the company a long time, and were perfectly satisfied with their remuneration.

Mr. RHODES said he had not consulted the board upon the subject, but thought it was proper and right to make the proposal. Directors ought to be well paid; but if it was not thought desirable to grant an increased allowance at present, he would postpone his motion till the next half-yearly meeting.

A PROPRIETOR said it was his fate to attend a great many meetings of different kinds, and he found men with crotchets upon all sides. The last speaker had a crotchet for raising the pay of directors. He was a shareholder in the London Company, and last year he proposed to raise the pay of the directors there. If the directors were underpaid, then pay them better; but their friend seemed to court notoriety by going all over the country making propositions of this kind.

On the motion of Mr. COXFORD, a cordial vote of thanks was given to the chairman and directors for their services during the half year; also to the auditors, the secretary, the engineer, and other officers of the company.

The proceedings then terminated.

ALLIANCE AND DUBLIN CONSUMERS GAS COMPANY.

The Half-Yearly Meeting of the Shareholders of the above Company was held on Friday, the 30th ult., at the Offices, 113, Grafton Street.

Mr. DENIS MOYLAN, chairman of the board of directors, presided.

There was a large attendance of shareholders.

The SECRETARY (Mr. John Stevenson) read the following report and statement of accounts for the past half year:—

The directors herewith submit to the proprietors the certified copies of the accounts, showing the working of the several stations during the half year ending the 30th of June, and which, it will be seen, present results of a very satisfactory character.

In rental there is an increase of £4469 over the corresponding period of last year, and although the sales of products are not so favourable as could be desired, it is nevertheless gratifying to know that the use of coke, and other residuals connected with the carbonizing department, is progressing, and more especially in the agricultural districts, where its value as a heating material is beginning to be understood and appreciated as it deserves.

In reviewing the operations of the half year, the board would direct the especial attention of the proprietors to the fact of the company's mains having been extended to two more of the suburban townships—namely, Clontarf and Ballybrack. These extensions cannot be expected to yield large immediate returns of rental, but, as both are rising and improving localities, the board confidently look forward to the period when the demand for gas will become, as in the other suburban districts, co-extensive with the limits of taxation. The board may add that as the Dublin Gas Act includes both these townships, and as it confers on the company the exclusive right of supply within their boundaries, they considered themselves morally, if not legally, bound to comply with the requisitions of the inhabitants, and afford them the same advantages in respect to the gas supply which have so largely contributed to the comfort and prosperity of the other suburban townships.

Another matter of importance to which the board consider it right to make special allusion on the present occasion is the movement recently made by the corporation to render the mains—or the right of laying mains—liable to payment of all the municipal rates and taxes. Hitherto this portion of the company's property has only been rated to the relief of the poor, but as considerable doubt has from time to time been thrown on the legality of such demands on the part of the local authorities, and moreover, as the legal decisions may be regarded as both conflicting and arbitrary, the directors have considered it their duty to take the necessary proceedings to test the validity of this claim. Under these circumstances, and while the matter is still pending before, and undecided by, the legal tribunals, it would be unbecoming on the part of your directors to question the policy or the justice of a demand which, if urged previous to the passing of the company's Act, might have materially modified the provisions of a contract which, according to the returns and reports of the corporation, has been the means of effecting a very large saving in the public lighting of the city.

There is nothing very special to report in reference to the condition of the several stations; all are in thorough repair, and in good working order, and the board are happy to say that the important alterations at Brunswick Street station will be completed by the middle of October, when results of the most favourable nature may be reasonably anticipated from the action of improved and modernized machinery. During the half year due attention has been paid to economy in the cost of working and material; and although the necessary wear and tear consequent on the operations of the half year forms an important item in the accounts now submitted to the proprietors, it is pleasant to know that every portion of the works and plant has been maintained, and is at present in such a thoroughly effective condition as to ensure useful and satisfactory results during the winter.

While referring to the works and their alterations, it may be right to state that the more modern mode of purifying the gas by the substitution of oxide of iron for wet lime is now in operation at all the stations of the company. The abandonment of one process and the adoption of another has, it need scarcely be added, been attended with considerable expense; but, as the Public Health Department of the corporation appeared determined on carrying their notions of sanitary improvement into practical effect, the board have yielded to circumstances, and, having done so, they may reasonably anticipate a cessation of the complaints so perseveringly and so pertinaciously urged against the use of an economical and effective agent in depriving illuminating gases of some of their most objectionable compounds.

There is but one other matter to which the board consider it necessary to direct the attention of the proprietors—namely, the necessity of providing additional storeage for gas. At present the gasholders on Sir John's Quay and Great Brunswick Street are barely sufficient to meet the public requirements, and as another vessel of large dimensions must be supplied and ready for action before the winter of 1871, and as all the disposable space at both stations is required for the storeage of coke, the directors have obtained a lease on equitable terms of a plot of ground adjoining the boundary of the Dublin and Kingstown Railway, and in convenient proximity to the works, where several large gasholders may be erected as the exigencies and necessities of the company may from time to time require.

As the cost of new works or extensions cannot be charged to revenue, the board have considered the propriety of calling up some of the outstanding capital, and as they have reason to believe that many of the proprietors are desirous of adding to their investments, the board will probably respond to their wishes by making a call on the shareholders towards the latter end of the year.

The board have now only to direct attention to the accounts, and especially to the profit and loss account, showing a net gain on the operations of the half year of £16,424 10s. 5d., from which they recommend payment of a dividend, free of income-tax, at the rate of 8 per cent. per annum.

Dr. *Balance-Sheet, Half Year ending June 30, 1870.* *Cr.*

To Purchase of gas-works, and amount expended, as per account, Dec. 31 last, including lamp-posts and lamps	£550,228	5	9		By Proprietors stock, class A	£152,000	0	0
Expended this half year	10,989	16	2		Ditto, class B	50,000	0	0
			£561,218	1 11	Ditto, class C, No. 1	135,000	0	0
Stores			3,957	2 2	Ditto, class C, No. 2	66,000	0	0
Coal—stock on hand			21,636	8 0			£403,000	0 0
Coke, breeze, and tar on hand			537	8 2	Company's bonds, at 4½ per cent.	£67,500	0	0
Cash and bills receivable			116	11 8	Ditto ditto, at 5 per cent.	80,000	0	0
Due for gas and meter rent			32,815	1 3			147,500	0 0
Ditto coke, breeze, and tar			2,644	6 6	Contingent-fund	£1,853	16	1
Ditto fittings	£927	12	3		Reserve-fund	£16,206	17	8
Ditto rent of fittings	64	4	5		Gain this half year	16,424	10	5
			991	16 8			32,631	8 1
Due by sundry persons (amount advanced on contracts)			2,528	3 2	Insurance-fund		765	1 5
							35,250	5 7
					Bills payable	£12,912	3	11
					Debts due to sundry persons	25,170	18	7
					Unclaimed dividends	1,168	13	5
					Deposit account	1,442	18	0
							40,694	13 11
			£626,444	49 6			£626,444	19 6

Dr. *Abstract of Revenue and Expenditure, Half Year ending June 30, 1870.* *Cr.*

By Revenue derived from gas and meter rent	£63,621	19	0					
Sales of products, less stock on hand, Dec. 31 last	12,419	15	1					
Transfer fees	62	10	0					
			£76,104	4 1				
To Coals carbonized	£33,056	17	5					
Wages	6,960	1	11					
Salaries—directors, secretary, chief engineer, engineers, and clerks	2,365	15	0					
Charges—collectors commission accounts, &c.	3,432	3	3					
Rent and taxes	1,515	2	6					
Lime used in purifiers	480	1	10					
Wear and tear	6,410	4	3					
Ditto—repairing meters	925	0	0					
Interest on bonds	3,466	2	1					
Law costs	101	13	10					
Interest account	182	16	7					
Bad debts	783	15	0					
			59,679	13 8				
Net gain			£16,424	10 5				

The net profits for the half year are £16,424 10s. 5d., out of which the directors recommended a dividend at the rate of 8 per cent. per annum.

The CHAIRMAN said: Gentlemen, the report for the half year ending last March must be deemed satisfactory, when compared with the report for the corresponding period last year. The increase of rental to the extent of £4469 is very considerable. No doubt the extensions to Clontarf and Ballybrack caused considerable expenditure of capital, as did also the change in the mode of the purification of the gas. The board deemed it right to meet the views of the health department of the corporation, although the highest scientific authority preferred the wet lime process to that of oxide of iron, when the former is carried out under arrangements that render it perfectly unobjectionable. The board are gratified at being able to sustain the increased dividend that was declared at the March meeting. The works and plant are in the best condition. During the past winter much inconvenience was experienced for gas storeage, and on many occasions the supply had to go nearly direct from the retorts, which involved waste and loss. To meet this difficulty a plot of ground near the works has been taken, upon which they purpose forthwith to erect a large gasholder, and space will remain for others should such be required. The high illuminating standard of 16-candle gas has been kept up in accordance with the corporation contract. I am not aware that the city inspector reported any material deficiency. From private consumers the complaints are few indeed, and when investigated are usually attributable to defective fittings. From time to time several proprietors have suggested to the board their wish that some of the classes of shares should be equalized; consequently a call of a moderate amount will be made in the latter part of this year. The report gives you such ample information that I do not think it necessary to trespass further on your attention in moving, as I now do, that the report and statement of accounts for the past half year be received and adopted.

Mr. JOSEPH BOYCE seconded the resolution, which was adopted unanimously.

The CHAIRMAN next moved that a dividend at the rate of 8 per cent. per annum, free of income-tax, be declared divisible amongst the various classes of shareholders, and payable on and after the 22nd of October next.

Mr. EDWARD FOTTRELL seconded the resolution, which was passed.

Mr. MADDEN moved a vote of thanks to the board of directors for the care and attention they bestowed on the affairs of the company.

The motion was seconded by Mr. M. KENNY, and unanimously agreed to.

The CHAIRMAN observed that the directors had always laboured to the best of their ability for the welfare of the company, and they would continue to do so.

Mr. JOSEPH BOYCE having been called to the second chair,

Mr. FOTTRELL moved a vote of thanks to Mr. Denis Moylan, the chairman of the company, not only for his dignified conduct while presiding, but for the very great zeal he displayed in promoting the interests of the shareholders.

Mr. BURKE seconded the resolution, which was passed by acclamation.

Mr. BOYCE said he begged, as a shareholder, to move a cordial vote of thanks to Mr. Stevenson, the excellent secretary of the company, and to the other officers, for their efficient services, and the highly satisfactory manner in which they discharged their several duties to the company and to the public. Of Mr. Stevenson's abilities and services it was impossible to speak too highly, and the staff of the company were all that could be desired.

Mr. LAMBERT seconded the resolution, which was agreed to unanimously.

Mr. STEVENSON, on the part of himself and his brother officers, thanked the meeting for their kind and flattering appreciation of their services. He believed all the officers were influenced by the most anxious desire to forward the best interests of the company. He could say, both of the gentlemen engaged at the works and in the office, from many years' experience of them, that they were all thoroughly animated with the desire to advance the welfare of the company.

The proceedings then terminated.

THE LATE DR. W. A. MILLER, F.R.S.—Our readers will learn with regret the death of this eminent chemist, which took place at Liverpool, whither he had gone to take part in the proceedings of the British Association, on the 30th of last month. Dr. Miller was born at Ipswich in 1817, and at an early age was apprenticed to his uncle, a surgeon at Birmingham. He afterwards became a student at King's College, London, where his chemical knowledge obtained for him the notice of Professor Daniell, whose assistant he subsequently became, and whom he succeeded in the professorship in 1845. From that time Dr. Miller has been one of the most prominent chemists in the metropolis, enjoying a large consulting practice, and frequently appearing as a witness before committees and in courts of law. As a writer he is best known by his "Elements of Chemistry," one of the best manuals of the science ever produced. As a scientific man he will probably be longest remembered in connexion with his most recent researches on stellar chemistry. Some of his earliest contributions to science were observations on the spectra of various flames, and during his whole career he continued a diligent worker with the spectroscope, by means of which, and in conjunction with his friend, Mr. Huggins, he has within the last few years obtained for us such an accurate knowledge of the constitution of the heavenly bodies. Dr. Miller was highly esteemed for the simplicity of his manners and his severe conscientiousness, and his loss will be deeply regretted by all who enjoyed his friendship.

THE SCIENTIFIC PRINCIPLES REGULATING THE ECONOMIC DISTILLATION OF GAS FROM COAL.

By Dr. STEVENSON MACADAM, F.R.S.E., F.C.S.
Lecturer on Chemistry, and Consulting Analytical Chemist, Edinburgh.

[*Abstract of Lecture delivered before the North British Association of Gas Managers, at the Annual General Meeting, held July 28.*]

The scientific principles which regulate the distillation of gas from coal have not hitherto demanded that attention which the importance of this branch of technical chemistry undoubtedly deserves. In Scotland, the supply of cannel or parrot coal, at a comparatively cheap rate, from fields blindly supposed to be inexhaustible, and in England the intense desire to consider the coke as of equal if not greater importance to the gas, have probably heretofore led scientific as well as practical men to regard this branch of industry as in a sufficiently forward condition, and as quite able to take care of itself. Now-a-days, however, more attention must be paid to the subject. Gas-works are multiplying and extending. The consumption of coal is yearly increasing, and some of our best seams are giving alarming evidence of exhaustion at no very distant day. It behoves us, therefore, to discuss the scientific principles which regulate the distillation of gas from coal, so as best to know whether we are proceeding in the right direction in our every-day work, and whether we are adopting the most economical method of distillation.

For some years the lecturer has directed his attention to this subject, and has not only studied the chemistry or scientific part, but, by means of thoroughly equipped apparatus, has been enabled to make a large number of experiments which have led to important practical results.

The chemical formula for pure wood is $C_6 H_{10} O_5$, being 6 atoms of carbon, 10 of hydrogen, and 5 of oxygen; and as each atom of carbon weighs 12, each atom of hydrogen 1, and each atom of oxygen 16, it follows that the actual proportions by weight, in which the elements are chemically united in the wood, are—carbon $6 \times 12 = 72$, hydrogen 10, and oxygen $5 \times 16 = 80$; making altogether 162. During the natural decay of ligneous and other vegetable matters, which has ultimately led to the formation of our coal-fields, the hydrogen and oxygen have been in greater part, and the carbon in lesser proportion, removed in the form of carbonic acid, CO_2, light carburetted hydrogen, CH_4, hydrogen, H., water, $H_2 O$, &c., leaving the coal with a comparatively greater per centage of carbon than what was present in the original ligneous or vegetable matter. The composition of pure wood and cannel coal, in 100 parts, clearly shows this:—

	Ligneous Matter. Pure Wood.	Average Sample of Cannel Coal.
Carbon	44·44	75
Hydrogen	6·17	7
Oxygen	49·39	9
Nitrogen, ash, &c.	..	9
Total	100·00	100

During the distillation of the coal for gas in ordinary retorts there are produced, by the destruction of the coal, a number of different gases and vapours, including heavy carburetted hydrogen, $C_2 H_4$, light carburetted hydrogen, CH_4, carbonic oxide, CO, hydrogen, H, and nitrogen, N, besides other substances which are arrested either in the condensers or in the purifiers. The coal gas, therefore, as ordinarily used, is a heterogeneous mixture of many different gases, of which the carburetted hydrogens are the luminous members, and the remaining gases are either faintly luminous or are non-combustible. The light-giving carburetted hydrogens are not confined to the two gases which have the chemical formulæ of $C_3 H_4$ and CH_4, but are also present as $C_2 H_4$ and $C_4 H_3$, when they possess even greater luminosity in burning. It is manifest, therefore, that the larger the proportion of the carburetted hydrogens, the greater the photogenic or light-giving power of the coal gas, whilst, when the other gases, such as carbonic oxide, hydrogen, and nitrogen, are present in increased amount, the luminosity of the coal gas must decrease in a corresponding degree.

During the earlier part of the distillation of gas from a charge of coal in the ordinary retorts, the light-giving carburetted hydrogens preponderate, whilst in the later stage of the process the less luminous gases are present in the greatest volume. It is manifest, therefore, that the first portions of gas evolved from a charge of coal will possess a much higher photogenic power than the last portions. The specific gravity or density of the earlier gas is also greater than that of the later gas, owing to the difference in the respective weights of the various gases which form the heterogeneous mixture known as coal gas. Thus, taking air as 1000, the heavy carburetted hydrogen, $C_2 H_4$, has the specific gravity of 978; light carburetted hydrogen, CH_4, 557; carbonic oxide, CO, 967; and hydrogen, H, 069. So that the hydrogen is eight times lighter than the light carburetted hydrogen, and 14 times lighter than the heavy carburetted hydrogen.

Besides the quality of the coal which is employed in charging the retorts, there are various circumstances which influence the photogenic value of the gas; such as the temperature of the furnace, and the length of time which the charge is kept in the retorts. A low heat leads to the obtainment of a small volume of gas of comparatively high quality, and reduces the proportion of non-luminous gases to a minimum; but such a method of procedure is far from economical, owing to the loss of luminous matter in the distillation of oil, and of vapours which condense either in the ordinary condensers or in the gas-holders and pipes. A high heat, on the other hand, increases the volume of gas at the expense of the luminosity, for it not only adds largely to the proportion of hydrogen and other non-luminous gases, but it tends to decarbonize or withdraw carbon from the more highly luminous gases. Thus heavy carburetted hydrogen, $C_2 H_4$, even when formed from the coal, is reduced to light carburetted hydrogen CH_4, when allowed to impinge upon an over-heated retort, there being at the same time a deposit of the missing atom of carbon in the interior of the retort. Indeed, the undue heating of the gas may cause the separation of the whole of the carbon from $C_2 H_4$ to CH_4, and to H itself, when the carbon is deposited in the retort, and the hydrogen, now expanded to double the volume of the original carburetted hydrogen, passes through the meter, and is recorded as gas. It will thus be observed that a low temperature in the distillation of gas is wasteful, owing to the production of oil and condensable vapours, and a high temperature is wasteful, from the decarbonization of the luminous gases. The skill of the gas engineer lies in determining the proper heat which will at the same time prevent, on the one hand, the distillation of oil and non-permanent gas, and, on the other hand, the destruction of the more useful gas.

Even when the proper heat has been commanded there are various suggestive points to be considered; such as the duration of the time of the distillation of each charge, and the most economical way of using coals in mixture or otherwise. Both of these matters have occupied much of the lecturer's time and attention, and important results have been arrived at after a lengthened series of practical experiments.

The time during which each charge should be heated in the retort must depend much on the quality of the coal itself, but there is reason to believe that the period might be materially shortened with great advantage to the photogenic or light-giving power of the gas, though at the same time to a loss in the total quantity of the gas. The decrease in volume, however, is mainly in those gases which are faintly or not at all luminous, but which in burning evolve the highest heat. Many experiments were made with cannel or parrot coals for the purpose of arriving at correct and trustworthy data as to the difference in the quantity and quality of the gas evolved from such coals, when distilled in long or full-time charges and in short-time charges. In both sets of trials the retorts and furnaces were kept as nearly as possible at the same heat, and the only difference in the mode of working was that whilst in the long or full-time charges the gas was practically worked out of the coal in the time and manner followed in ordinary gas-work experience, in the short-time charges the gas was eliminated from the coal for a period of time equal to about three-fourths of that which was occupied in the long or full-time charges. In other words, where a charge would be heated for four hours in the long or full-time mode of working, a similar charge was heated only for three hours in the short-time trials, when the operation of distillation was stopped, and the coke was withdrawn.

The coals experimented upon were the Haywood cannel coal, the Bank gas coal (both upper and lower seams), the Lochgelly parrot coal, and the Raith parrot coal. The detailed results of the practical trials are given in the following tables, where the yield of gas in the long-time charges may be contrasted with that given in the short-time charges:—

Haywood Cannel Coal.

	Long-Time Charges.	Short-Time Charges.
Yield of gas from 1 ton of the coal	11,153 cub. ft.	9333 cub. ft.
Specific gravity of the gas (air = 1000)	572	591
Total weight of the gas from 1 ton of the coal	489 lbs.	423 lbs.
Condensation by bromine = heavy hydrocarbons	15 per cent.	16 per cent.
Durability of the gas—1 cubic foot burned at a 4-inch single jet	73 min.	76 min.
Ditto, 5-inch ditto	58 „	61 „
Illuminating power of the gas—5 cubic feet burned during the hour from a No. 5 fishtail or union burner—in standard sperm candles	30·97 candles	34·87 candles.
Total illuminating power of the gas obtained from 1 ton of the coal in pounds of sperm	1178 lbs.	1144 lbs.

These results show that in distilling the Haywood cannel coal in short-time charges, as contrasted with long-time charges, the yield of gas decreased from 11,153 to 9333 cubic feet, being 1820 cubic feet, or 1-6th less gas; that the candle power increased from 30·97 to 34·87, being a difference of 3·90 candles, or 1-8th more; and that the total illuminating power of the gas from 1 ton of the coal decreased from 1178 to 1144 lbs., being 34 lbs. deficiency, or 1-35th of the whole light.

Bank Gas Coal—Upper Seam.

	Long-Time Charges.	Short-Time Charges.
Yield of gas from 1 ton of the coal	10,080 cub. ft.	8516 cub. ft.
Specific gravity of the gas (air=1000)	527	543
Total weight of the gas from 1 ton of the coal	407½ lbs.	355½ lbs.
Condensation by bromine = heavy hydrocarbons	14 per cent.	15 per cent.
Durability of the gas—1 cubic foot burned at a 4-inch single jet	74 min.	77½ min.
Ditto, 5-inch ditto	59 „	62 „
Illuminating power of the gas—5 cubic feet burned during the hour from a No. 5 fishtail or union burner—in standard sperm candles	27·67 candles.	31·45 candles.
Total illuminating power of the gas obtained from 1 ton of the coal in pounds of sperm	956 lbs.	918 lbs.

In this case the Bank gas coal gave 1564 cubic feet less gas by the short-time charges, which is equal to 2-11ths of the whole yield by the long-time charges; but the candle power was raised 3·78, or 1-8th more, and the total illuminating power of the gas from 1 ton of the coal exhibited a decrease of 38 lbs., or 1-25th of the whole.

Bank Gas Coal—Mixed Upper and Lower Seams.

	Long-Time Charges.	Short-Time Charges.
Yield of gas from 1 ton of the coal	10,126 cub. ft.	8468 cub. ft.
Specific gravity of the gas (air=1000)	524	542
Total weight of the gas from 1 ton of the coal	407 lbs.	352 lbs.
Condensation by bromine = heavy hydrocarbons	13·75 per cent.	14·8 per cent.
Durability of the gas—1 cubic foot burned at a 4-inch single jet	71 min.	77 min.
Ditto, 5-inch ditto	57 „	61½ „
Illuminating power of the gas—5 cubic feet burned during the hour from a No. 5 fishtail or union burner—in standard sperm candles	27·07 candles	31·28 candles
Total illuminating power of the gas obtained from 1 ton of the coal in pounds of sperm	940 lbs.	908 lbs.

The mixed seams of the Bank gas coal thus yielded by the different methods of working 1658 cubic feet less gas, or 1-6th of the total quantity; whilst the photogenic power of the gas rose 4·21 candles, or 1-7th more, and the light from 1 ton of coal decreased 32 lbs., or 1-30th of the total quantity.

Lochgelly Parrot Coal.

	Long-Time Charges.	Short-Time Charges.
Yield of gas from 1 ton of the coal	10,040 cub. ft.	8460 cub. ft.
Specific gravity of the gas (air = 1000)	515	532
Total weight of the gas from one ton of the coal	396½ lbs.	345 lbs.
Condensation by bromine = heavy hydrocarbons	11·5 per cent.	13 per cent.
Durability of the gas—1 cubic foot burned at a 4-inch single jet	65 min.	70 min.
Ditto, 5-inch ditto	52 „	56 „
Illuminating power of the gas—5 cubic feet burned during the hour from a No. 5 fishtail or union burner — in standard sperm candles	26·24 candles.	29·82 candles.
Total illuminating power of the gas obtained from 1 ton of the coal in pounds of sperm	903 lbs.	865 lbs.

The Lochgelly parrot coal, therefore, gave in the short-time charges 1580 cubic feet, or 1-6th less gas; the illuminating power of the gas rose 3·58 candles, or 1-7th more; and the total light was 38 lbs. less, or 1-24th of the whole amount.

Raith Parrot Coal.

	Long-Time Charges.	Short-Time Charges.
Yield of gas from 1 ton of the coal, .	9630 cub. ft.	8180 cub. ft.
Specific gravity of the gas (air = 1000).	511	526
Total weight of the gas from 1 ton of the coal	377½ lbs.	330 lbs.
Condensation by bromine = heavy hydrocarbons	11 per cent.	12·5 per cent.
Durability of the gas—1 cubic foot burned at a 4-inch single jet . .	64 min.	69 min.
Ditto, 5-inch ditto	51 „	55 „
Illuminating power of the gas—5 cubic feet burned during the hour from a No. 5 fishtail or union burner—in standard sperm candles	25·61 candles.	29·26 candles.
Total illuminating power of the gas obtained from 1 ton of the coal in pounds of sperm	845 lbs.	822 lbs.

This coal, in the short-time charges, yielded 1450 cubic feet, or 1-7th less gas; the photogenic power increased 3·65 candles, or 1-7th more; and the total gas from 1 ton of the coal was equal to 23 lbs., or 1-37th less than in the trial with full-time charges.

The foregoing results as given in the five different sets of trials may be averaged as follows:—

Average Results of Experiments on Different Coals.

	Long-Time Charges.	Short-Time Charges.
Yield of gas from 1 ton of the coal .	10,205 cub. ft.	8591 cub. ft.
Specific gravity of the gas (air=1000) .	529·8	546·8
Total weight of the gas from 1 ton of the coal	415·5 lbs.	361·1 lbs.
Condensation by bromine = heavy hydrocarbons	13·05 per cent.	14·26 per cent.
Durability of the gas — 1 cubic foot burned at a 4-inch single jet. .	69·4 min.	73·9 min.
Ditto, 5-inch ditto	55·4 „	59·1 „
Illuminating power of the gas — 5 cubic feet burned during the hour from a No. 5 fishtail or union burner — in standard sperm candles	27·51 candles.	31·33 candles.
Total illuminating power of the gas obtained from 1 ton of the coal in pounds of sperm	964·4 lbs.	931·4 lbs.

From this latter table it will be observed that the average of the five trials shows a decrease of 1614 cubic feet, or fully 1-6th of the full quantity; whilst the luminosity has increased 3·82 candles, or fully 1-7th more; and the total illuminating power of the gas from 1 ton of the coal exhibits a deficiency of 33 lbs., or 1-30th of the whole light.

A summary of all these results is given in the following table:—

Summary of Results of Experiments in the Distillation of Gas from Cannel Coals in Long-Time Charges compared with Short-Time Charges.

Name of Coal.	Mode of Distillation.	Yield of Gas from One Ton of the Coal.	Total Weight of Gas from One Ton of the Coal.	Illuminating Power of Five Cubic Feet of the Gas in Sperm Candles.	Illuminating Power of the Total Gas from One Ton of Coal in Pounds of Sperm.
		Cubic Feet.	lbs.	Candles.	lbs.
Haywood Cannel Coal	Long-Time Charges	11,153	489	30·97	1178
	Short-Time Charges	9,333	423	34·87	1144
	Difference.....	1,820	66	3·90	34
Bank Gas Coal, Upper Seam.	Long-Time Charges	10,080	407¼	27·67	956
	Short-Time Charges	8,516	355¼	31·45	918
	Difference.....	1,564	52	3·78	38
Bank Gas Coal, Mixed Upper and Lower Seams.....	Long-Time Charges	10,126	407	27·07	940
	Short-Time Charges	8,468	352	31·28	908
	Difference.....	1,658	55	4·21	32
Lochgelly Parrot Coal.....	Long-Time Charges	10,040	396½	26·24	903
	Short-Time Charges	8,460	345	29·82	865
	Difference.....	1,580	51½	3·58	38
Raith Parrot Coal.....	Long-Time Charges	9,630	377½	25·61	845
	Short-Time Charges	8,180	330	29·26	822
	Difference.....	1,450	47½	3·65	23
Average Results of Five Experiments...	Long-Time Charges	10,205	415·5	27·51	964·4
	Short-Time Charges	8,591	361·1	31·33	931·4
	Difference.....	1,614	54·4	3·82	33·0
		Being fully 1-6th less Volume of Gas.	Being fully 2-15ths less Weight of Gas.	Being fully 1-7th more Illuminating or Photogenic Power.	Being 1-30th less Total Light from Gas yielded by One Ton of Coal.

The advantages and disadvantages of working on short-time charges, as compared with long-time charges, may be summed up as follows:—The advantages are, the increase of the candle power of the gas, and the exclusion of a considerable amount of gases, which are mainly dilutants of ordinary gas, and which are objectionable, owing to the large share they have in the production of heat in our apartments. The disadvantages are, the loss in the volume of the gas, even though it be of a faintly luminous nature, and the deficiency in the total light yielded by the gas from 1 ton of the coal, even though that amounts only to 1-30th of the whole available light—coupled also with the extra expense of working the retorts. The more the matter is looked at, however, the advantages appear all the more clear and decided. The increase in the candle power will admit of less expensive coals being employed in the distillation of better gas, for the difference in the mode of working ensures a rise of nearly 4 candles in the quality of the gas. The comparatively useless nature of the gases which are excluded may be learned from the fact that, whilst 1-6th of the total volume of the gas is held back, there is only 1-30th less light from the ton of coal. Moreover, the coke of the short-time charges, when withdrawn from the retorts, does not evolve much luminous gas, and it appears well-nigh exhausted of all its light-giving power. We may safely, therefore, affirm that the distillation of gas from coal by short-time charges is to be commended, because of the better quality and increased luminosity of the gas, and the comparative exclusion of gases which are more heating than luminous in their nature. These results point to the general use of gas with the greatest amount of pleasure and benefit to the consumer, and probably also from the possibility of employing cheaper qualities of coals, to the pecuniary gain of the gas manufacturer.

Mr. Macadam then entered on the question of the admixture of the coals, and of the improved quality of the gas obtained from the distillation of such mixtures in the same retort, as compared with that obtained from the distillation of the same coals in different retorts, and the subsequent mingling of the gases. These results were published in the JOURNAL of Jan. 4, 1870, and Dr. Macadam's remarks were mainly directed to a more full explanation of the chemistry of the reactions which gave rise to the increase in the photogenic or illuminating power of the resultant gases.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The following papers were read at the late meeting of the association, at Liverpool:—

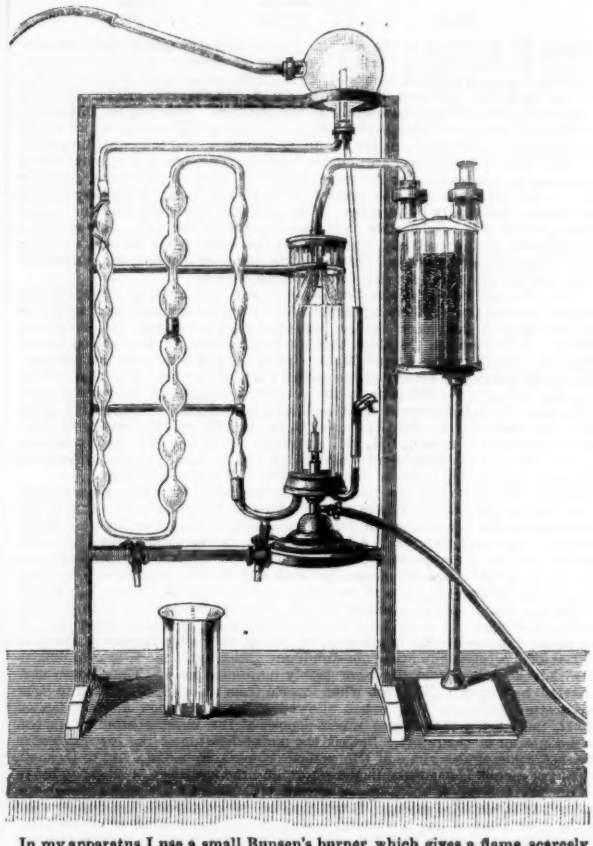
ON A METHOD FOR THE DETERMINATION OF SULPHUR IN COAL GAS.

By A. VERNON HARCOURT, Esq., M.A., F.R.S., Sec. C.S.

The apparatus on the table represents the result of a number of experiments on the determination of sulphur in coal gas, and provides, I believe, a means of making this determination easily and accurately.

But since its completion a new method of determining sulphur has been published and brought into use by the gas referees, and as this method is certainly superior in simplicity, and may be superior in other respects to that which I have devised, I feel some hesitation in laying any claim to the attention of the section. However, the problem to be solved is one of so much difficulty and so much importance, that I will venture to describe very briefly the process which is here in operation.

Some difference of opinion exists as to the statement of the problem. Do we desire to know the total amount of sulphur in the gas analyzed, or the amount which is converted into sulphur acids when a jet of gas is burned in the air? On the one hand, the practical object being to ascertain the injury to which we are liable from gas burned in the ordinary way, and the only sulphur compounds formed by burning gas, which are known to be injurious, being the sulphur acids, a method in which the acids formed by a jet of gas burning in the air are determined appears the most appropriate. On the other hand, we can hardly expect to arrive at definite and concordant results, except by determining the total amount of sulphur, since the part, if any, that commonly escapes unburnt, is likely to vary with the burner employed. I believe, however, that it will be found that this distinction is not a very real one, but that in a jet of gas which is well supplied with air, $\frac{99}{100}$ths of the sulphur is oxidized.



In my apparatus I use a small Bunsen's burner, which gives a flame, scarcely visible in the daylight, of three-quarters of an inch in length when burning at the rate of a quarter of a cubic foot per hour. The gas is supplied by means of an aspirator with between 20 and 50 times its volume of air. A funnel placed at the top of the cylinder in which the gas burns admits the air through holes in its neck and distributes it down the sides of the cylinder, while the products of combustion and the excess of heated air are withdrawn from within the funnel through a tube rising from the bottom of the cylinder. This tube fits loosely into another tube, which passes through an india-rubber plug closing the cylinder, and is attached to a system of bulbs, through which are driven the air in which the gas has burned, and the liquid used to wash it. From the bulbs they pass into a two-necked receiver placed over the cylinder, whence the air escapes into the aspirator, while the liquid descends through a small tube to the bottom of the cylinder and repeats its course.

The liquid is an ammoniacal solution of copper. The ammonia serves, as is well known, to aid in fixing the sulphur compounds, while the copper determines, in presence of the excess of air, the oxidation of sulphite to sulphate. The activity of copper in this respect may readily be proved by pouring into each of two large bottles a few drops of ammonia and of sulphurous acid, and adding, in one case, a drop of a solution of any copper salt. After shaking both

bottles for a minute or two to bring the liquid and air contained in them into contact, if some dilute sulphuric acid is poured into each, and then some solution of iodine, it will be found that in one case plenty of sulphurous acid remains, but that in the other, when the drop of copper solution was added, all has disappeared.

When coal gas burns, the greater part of its sulphur seems to be oxidized completely to sulphuric acid, but a part of it only to sulphurous acid, and it may well happen that some of this sulphurous acid, after being arrested by the ammonia, may be disengaged again by the great excess of carbonic acid by which it is accompanied, and may finally escape from the solution. Once converted into sulphate it is safe.

The air which enters the cylinder has passed first through a large Woolfe's bottle containing pumice and ammoniacal solution of copper, the latter rising three or four inches from the bottom of the bottle, the former to the top. Before each experiment 50 c.c. of strong ammonia is poured into the bottle. This arrangement serves to keep up the supply of ammonia in the apparatus, and to purify the air from traces of sulphurous acid or sulphuretted hydrogen. To trust to the purity of the air, even in rooms which are not chemical laboratories, appears to be very hazardous, when we consider that the volume passing through the apparatus in each experiment is 50 cubic feet, or more, and that 1-50th of a grain of sulphur in this volume would be reckoned as an additional grain in 100 cubic feet of the gas.*

When about 2 cubic feet of gas have been burned the operation is stopped, and the liquid withdrawn through two nipper-taps; a charge of water is sent round the apparatus by the aspirator, and drawn off into the same vessel as the original liquid. The drainage is sufficiently complete for a second washing to be hardly needed. It is convenient to get rid of most of the ammonia and part of the water by evaporation before precipitating with barium chloride.

To test the trustworthiness of the results obtained by this method, I have substituted for the lamp a tube, through which was passed, for as many hours as the process ordinarily occupies, a current of carbonic acid which had bubbled through a very dilute solution of sulphurous acid, whose strength was determined before and after the experiment. It was found that within the limits of error likely to occur in estimating the strength of the solution of sulphurous acid, the weight of sulphate of baryta obtained corresponded to the sulphurous acid which had passed out of the solution. It was in making these experiments that my attention was forcibly directed to the need of purifying the air, for I found at first that more sulphate of baryta was precipitated than the sulphurous acid could furnish. The air had passed through a bottle containing pumice and permanganate of potash, but the contents of the bottle had become dry, and therefore inoperative. In subsequent experiments the air was more efficiently purified, and the weight of sulphate of baryta was no longer in excess.

The completeness of the washing effected in the apparatus has also been tested by interposing a second set of bulbs, with a charge of ammoniacal solution of copper, between the aspirator and the apparatus. The liquid from these bulbs has always yielded a trace, but a mere trace of sulphate of baryta.

Lastly, I have made a number of simultaneous determinations of the same sample of coal gas.

I will give the results of four pairs of determinations of samples of gas supplied by the Oxford Gas Company, made on consecutive days:—

	Sample	A	B	C	D
Grains of sulphur in 100 cubic feet.	1.	21·0	19·9	20·1	20·8
	2.	21·4	20·0	20·3	20·5

Since completing this apparatus I have made some experiments with a view to a more complete purification of coal gas from sulphur. Two pairs of analyses of the purified gas gave the following numbers:—

	Sample	A	B
Grains of sulphur in 100 cubic feet.	1.	4·54	4·49
	2.	4·57	4·54

* Dr. Angus Smith has found the amount of sulphurous acid in Manchester air to attain sometimes to as much as 1-1000th per cent. Such air admitted without purification would affect a sulphur test to the extent of 16 grains in 100 cubic feet of gas.

ESTIMATION OF SULPHUR IN COAL GAS.

By William Marriott, F.C.S.

After coal gas is passed through lime or oxide of iron to separate the sulphuretted hydrogen, there still remains certain sulphur compounds not removed by these media. As the gas containing these sulphur compounds gives off sulphurous acid when burned, cognizance of the fact has been taken in recent gas legislation, and 20 grains of sulphur in 100 feet of gas fixed as a maximum.

As one means of estimating the quantity of sulphur contained in coal gas, I have the honour of submitting to this section a simple form of apparatus devised for this purpose, and a series of experiments made with the same.

Some years ago Dr. Letheby introduced a form of apparatus for this purpose, very simple in construction, easily manipulated, and not liable to get out of order. It is by means of this apparatus the amount of sulphur is to be ascertained, in compliance with the conditions of the Metropolis Gas Act of 1860.

By referring to the diagram you will understand the principle of its operation.

Dr. Letheby does not recommend this apparatus as giving correct chemical results, but sufficiently approximate for manufacturing purposes. From its construction, it is impossible to be certain that all the sulphurous acid is oxidized or condensed, as this depends on the current of air passing through the tube and the temperature of the atmosphere; in fact, a small quantity of sulphurous acid escapes up the condensing-pipe all the time the apparatus is at work.

I have tried a great number of experiments with the apparatus, and it is difficult to account for the variation shown in the different testings. For instance, I almost invariably detect a greater quantity of sulphuric acid in hot weather, and the results are more nearly correct if 4 feet only of gas are burned than a larger quantity.

I believe Dr. Letheby recommends the combustion of gas to be half a foot per hour, the experiment to be continued 24 hours.

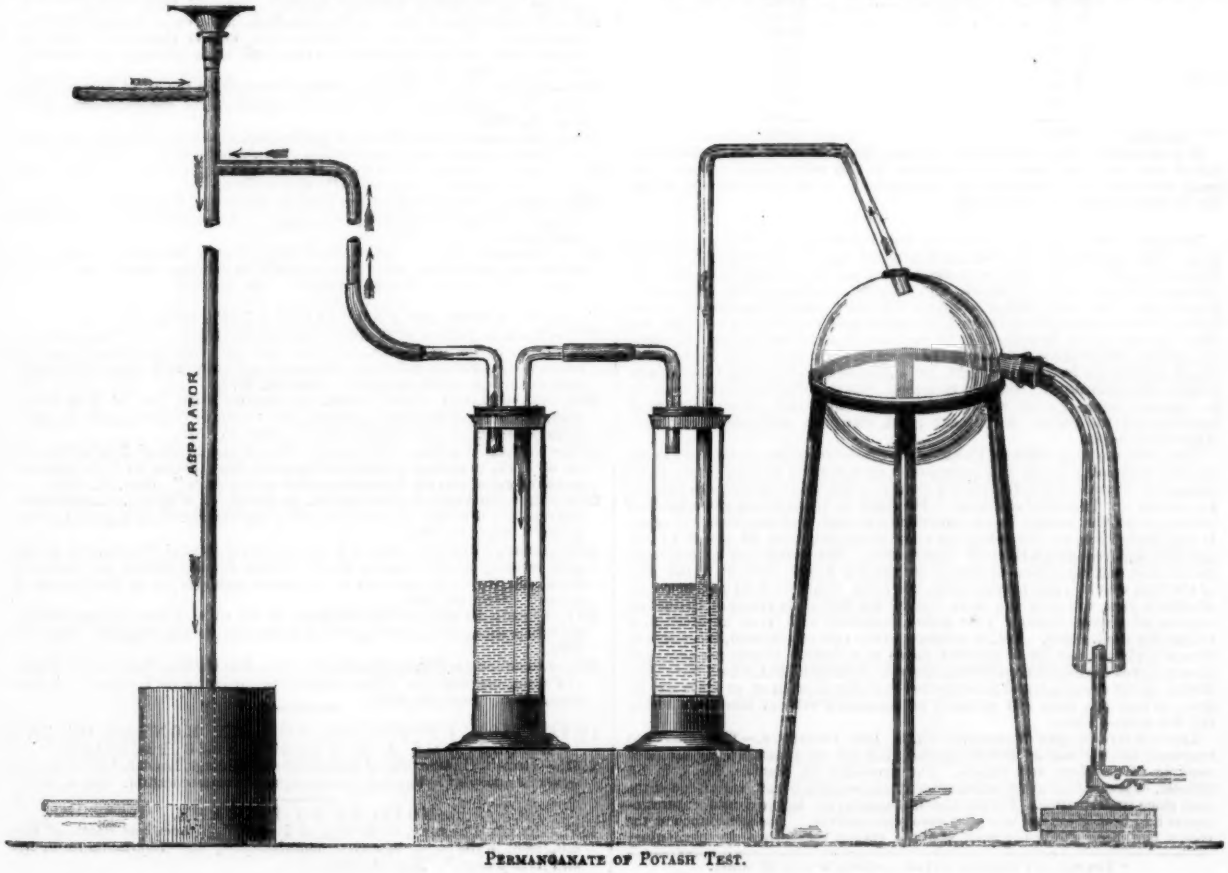
Very recently the gas referees, under the City of London Gas Act of 1868, have issued a report, in which they give the results of a great number of testings, to ascertain the quantity of sulphur in the London gas, and also the points in its manufacture where the sulphur, so to speak, is picked up. To decide this they have modified the Letheby apparatus, and report the modification as giving more trustworthy results.

The gas referees, in their sulphur test, substitute carbonate for caustic ammonia, to ensure greater uniformity in the supply of ammonia during combustion of the gas; and their apparatus exposes a greater condensing surface, and also steadies the draught. By means of these improvements in this sulphur test, the referees are able to detect and report from 20 to 25 per cent. more sulphur in the London gas than previously estimated by the test of Dr. Letheby.

Both the apparatus of Dr. Letheby and the London referees are open to the same objection—you cannot be certain that sulphurous acid has not escaped through the condensing-tube. I think I am justified in saying that some does escape oxidation, and the difference this makes is sufficient, probably, to invalidate the whole of the experiments mentioned in the referees report on the increase of sulphur in scrubbing and purifying.

The apparatus I use and show in the diagram is, to a certain extent, a modification of Dr. Letheby's, though it differs in the mode of oxidation. I draw all the products of combustion through a solution of permanganate of potash, which converts the sulphurous into sulphuric acid.

The gas is burned under a trumpet-shaped tube, connected with a globe receiver; and from a tubulure in the globe proceeds a tube, conveying the products of combustion into a flask, in which is a solution of permanganate of potash. The tube dips 3 inches into this solution. A second flask is connected in like manner, through which the gas bubbles on leaving the first flask. The combustion is kept up, and the products of combustion drawn through the solution of permanganate of potash, by means of an aspirator connected with the outlet of the second flask. The aspirator here used is a very simple piece of apparatus. Water from any constant supply is connected at the top with a



Permanganate of Potash Test.

straight upright pipe, 10 feet high and ½-inch internal diameter; the low end of the tube dips an inch into water contained in a vessel for that purpose. Six inches from the top of the upright pipe is a ½ branch, which is connected, by means of an india-rubber tube, with the absorption apparatus.

By gradually turning on the water, a point will be found where a strong current is drawn through the apparatus, quite sufficient to keep up a steady combustion and oxidation of all the sulphurous acid, by the solution of permanganate of potash through which it is drawn.*

I use 1½ grain of permanganate of potash for each foot of gas consumed, two-thirds of which is dissolved in the first flask; but the amount of salt required will depend upon the quantity of sulphur contained in the gas operated on.

The globe interposed between the burner and flask is to cool the current before entering the first solution. I use a Bunsen burner, and when 4 feet of gas are burned, the solution in the flasks, and the moisture condensed in the globe, are mixed together, and the sulphur estimated as sulphuric acid. No ammonia is required to mix with the gas when burned, or nitric acid to oxidize any sulphite.

The second flask is just a precaution, lest any sulphurous acid should escape the first. I have tested the second flask by leaving it for six testings, adding a grain of permanganate of potash each time, then ascertaining the amount of sulphur; ·33 grains of sulphur in 100 feet of gas is the greatest amount I have so detected in the second flask. This, you must remember, has to be divided amongst six testings.

In estimating the sulphuric acid, the baryta salt may be added to the permanganate of potash solution, either before or after the combustion of the gas. Some oxide of manganese is always precipitated, but this is easily removed by digestion with hydrochloric acid.

The following table gives the results of a series of experiments made at the Huddersfield Gas-Works. The two sets of apparatus were working side by side, and using the same gas. I have made a great number of testings, but those given in the table were made purposely for this paper.

The average for the Letheby apparatus is 8·75 grains of sulphur per 100 feet of gas. For the permanganate of potash solution 13·81, or, in other words, the Letheby, detects only five-eighths of the sulphur detected by the permanganate.

The gas made at the Huddersfield works is purified by lime, which will account in a great measure for the small amount of sulphur separated, as compared with the London gas. The average testing for the past four years, as supplied to me by Mr. Burgess, the manager, is 8·89.

To those who have worked with a Letheby apparatus, the permanganate of potash solution, as above arranged, will be easily manipulated, and as the oxidation of sulphurous acid by permanganate of potash is perfect, I can with confidence recommend the process to gas managers as giving true results.

The aspirator here described, I would strongly recommend to all those having the care of a gas-testing room. It will be found useful for many purposes besides the estimation of sulphur. For instance, the estimation of ammonia and carbonic acid, or wherever it is essential that a measured quantity of gas should be drawn through a solution.

TABLE.

Letheby.	Permanganate of Potash.
8·41	12·75
7·15	14·12
9·16	12·67
10·95	13·94
14·72	16·45
7·72	15·07
6·67	13·12
8·85	16·90
6·60	10·82
7·62	11·65
9·05	12·32
11·97	12·72
10·70	16·47
14·77	15·15
5·97	12·32
10·50	14·72
12·82	16·28
8·50	12·50
4·28	13·50
Average . . 8·75	13·81

In conclusion, I beg to thank Mr. Burgess, the manager of the Huddersfield Gas-Works, who has taken great interest in this subject, and rendered me every assistance in conducting the experiments. I am also indebted to him for the tables illustrating this paper.

INFLUENCE OF CARBONIC ACID ON THE ILLUMINATING POWER OF COAL GAS.—The experiments of Professor Rogers, in regard to the influence of carbonic acid upon the illuminating power of coal gas, demonstrate that, first, the addition of 1 per cent. of carbonic acid reduced the illuminating power 6 or 8 per cent.; but that further additions did not produce proportional reductions of illuminating power; second, the addition of air produced a greater loss than the addition of carbonic acid, 10 per cent. of air reducing down the light 70 per cent., while the same amount of carbonic acid reduced it only 40 per cent.; 45 per cent. of air destroyed all light, but it took 58 per cent. of carbonic acid to produce the same result. But Mr. Stimpson remarked that this series ought to be repeated before we can consider the proportions exact, since conditions of burning, and the burner itself, make great change in photometric results.—*American Chemist.*

THE CHELTENHAM SEWAGE FARM.—The Cheltenham Commissioners having recently completed works and purchased a farm for the disposal of the town sewage by irrigation, the first yearly letting of the irrigated land was effected by auction on Thursday afternoon. The land is all ordinary grass land, to which, as yet, the sewage is but imperfectly applied, and comprises 119 acres. It was divided into six lots, which let at prices varying from £5 18s. to £8 13s. per acre, and realizing a total of nearly £900. The yearly cost to the town for interest and repayment of loan in 30 years is £1100; so that, if the rent of the land should remain stationary, the town would only be put to a cost of £200 a year, and own the farm free at the end of 30 years, as against an expense of nearly £1000 a year before incurred, with very unsatisfactory results, for deodorizing. But, in addition to the rent of the land, the commissioners apply the sewage to adjacent farms at a certain charge per acre, and have reserved for experiment several acres of their own land, which have been broken up for rye-grass, and are expected to realize a profit of at least £20 an acre; so that the farm will probably be conducted without loss even during the first year.—*Times.*

LONDON GAS-WORKS WORKMEN'S CLUB AND INSTITUTE.—This club was reopened for the winter season on the 27th ult., at a numerously attended meeting of members and friends. The president (R. Morton, Esq.), in his address, expressed his great satisfaction at the success which had attended the club since its formation. During the last season, six lectures and entertainments had been given, all of which were well received. The attendance at the rooms had been uniformly good, and the classes established for elementary instruction had been productive of benefit to many members. Encouraged by the appreciation which had been shown, it was now resolved to add a library, several contributions to which were announced. Prizes would again be offered to the most successful competitors in games of skill, such as draughts, chess, &c., and also for the best mechanical model made by any member, and for the best written papers upon any subject. The meeting was also addressed by the Rev. G. M. Murphy, and J. T. M'Dougall, Esq., and the remainder of the evening was occupied by a selection of choruses, solos, and glees, appropriate to the occasion.

THE THAMES CONSERVATORS AND THE DISCHARGE OF SEWAGE INTO THE THAMES.—As a guide to the various townships which are now required to purify their sewage before it is discharged into the Thames, the Board of Conservancy have recently fixed upon and published a standard determining in what state effluent water will be allowed to flow into the river. The standard is as follows:—First, that the effluent water will be perfectly free from offensive odour; secondly, it shall not contain more than 3 grains to the gallon of suspended matter, and shall not exhibit by daylight a distinct opacity when a stratum of it 1 inch deep is placed in a white porcelain vessel; thirdly, it shall not be more acid than 1 of muriatic acid in 1000 of water, nor more alkaline than 1 of dry caustic soda in a like quantity of water; fourthly, it shall not contain more than 70 grains of solid matter to the gallon when dried at 260° Fahr.; fifthly, it shall not contain more than 2 grains of organic carbon to the gallon; sixthly, nor more than three-quarters of a grain of organic nitrogen; seventhly, when exposed for six hours, mixed with a quantity of river water, which, in relation to the effluent water, shall be in the same proportion as the quantity flowing in the river is to the quantity of effluent water from the sewers, 1 grain of organic carbon and one half grain of organic nitrogen per gallon shall be converted into innocuous matter. It will be seen at once that this standard is based on the recommendations of the Rivers Pollution Commission, with respect of the Mersey and Ribble basin. Free muriatic acid is a residue of the manufacture of soda, and is not likely to be produced on the banks of the Thames. The standard of alkalinity is also based on conditions which only apply to a district occupied by special manufactures. It is easy to see that the conservators are not chemists, nor can they, in this instance, have acted on chemical advice. We might add that they can hardly be gifted with common sense, or they would never have adopted, even with the modifications they have made, a standard determined upon "having in view the chief sources of pollution in the basins of the Mersey and Ribble," as applicable to the Thames.

THE TUNBRIDGE WELLS WATER-WORKS.—A curious story comes from Tunbridge Wells. Some time ago, works for the supply of water to the town were planned by and carried out under the direction of Messrs. Nixon and Dennis, at a cost of something like £70,000. They have proved a complete failure, and the local board have called in Messrs. Lawson and Mansergh to examine and report upon the works. The abstract of their report which has reached us does not enable us to arrive at a full comprehension of the case, but it appears that the reporters consider the works to have been badly planned and carelessly executed. Springs which, if we read the report aright, yield 232,560 gallons of good water per day, only supply the town with 136,400 gallons, which is equal to about 8 gallons per head of population. The loss is occasioned by leakage from badly laid stoneware pipes, and cracks in a reservoir lined with Seyssel asphalte. Further than this, it seems that while a good portion of the town might have been supplied by gravitation, the entire supply is pumped, necessarily at considerable cost. The recommendations of Messrs. Lawson and Mansergh amount almost to a reconstruction of the works, and a relaying of the collecting-mains, iron pipes being nearly everywhere substituted for stoneware.

* The aspirator described will lift a column of water 36 inches.

Register of New Patents.

APPLICATIONS FOR LETTERS PATENT.

2554.—WILLIAM FIRTH, of Rose Villa, Viewforth, Edinburgh, secretary to the North British Rubber Company, Limited, for "*Improvements in steam, air, and gas, and in fluid or hydraulic engines.*" Sept. 23, 1870.

2570.—HERBERT JOHN JONES, of Peckham Rye, in the co. of Surrey, for "*Improvements in the construction of drain-pipes, and in the mode of obtaining access thereto for forming connexions therewith or for cleansing or examining the same.*" Sept. 26, 1870.

2591.—GEORGE SYMES, of Goding Street, Vauxhall, in the co. of Surrey, engineer, for "*Improvements in portable apparatus for manufacturing gas.*" Sept. 29, 1870.

2618.—FREDERICK JAMES HEAD, of Eastbourne, in the co. of Sussex, engineer, for "*Improvements in the construction of cocks and valves.*" Oct. 1, 1870.

2631.—JOSEPH ALFRED ROTHWELL, of Ramsbottom, in the co. of Lancaster, for "*Improvements in stop-valves.*" Oct. 4, 1870.

2633.—GEORGE HASELTINE, of Southampton Buildings, London, for "*Improvements in combined lifting and force pumps.*" A communication. (Complete specification.) Oct. 4, 1870.

2653.—CHARLES FELTON KIRKMAN, of High Street, Islington, in the co. of Middlesex, gentleman, for "*Improvements in treating sewage, and in the apparatus and means employed therein.*" Oct. 6, 1870.

GRANTS OF PROVISIONAL PROTECTION.

2377.—THOMAS ATKINS, of St. Alban's, in the co. of Herts, for "*Improvements in apparatus for economizing the waste heat and gases from furnaces, and in means for generating, collecting, and purifying gases, such gases being applicable to various useful purposes.*" Aug. 31, 1870.

2497.—ISAAC HAIGH, JOHN HAIGH, and ISAAC HAIGH, jun., of West Bromwich, in the co. of Stafford, plumbers, for "*Certain improvements in apparatus in connexion with water-closets.*" Sept. 16, 1870.

2505.—THOMAS WALTON, of the firm of Walton and Brear, of Bradford, in the co. of York, plumbers, glaziers, and gas and steam fitters, for "*An improved means or apparatus for ventilating rooms or buildings.*" Sept. 17, 1870.

2506.—EDWARD KIDD, of Birmingham, in the co. of Warwick, manufacturer, and GEORGE BOURNE, of the same place, engineer, for "*An improved water-gauge.*" Sept. 17, 1870.

2516.—GUSTAV BISCHOF, jun., of Bonn, in the kingdom of Prussia, but at present residing at the Craven Hotel, Craven Street, Strand, in the co. of Middlesex, for "*Improvements in the means employed for the purification of water.*" Sept. 19, 1870.

2517.—HENRY HARRIS, of Southampton, in the co. of Hants, picture restorer, for "*Improvements in filtering and in apparatus for the purpose.*" Sept. 19, 1870.

2521.—ALEXANDER HORACE BRANDON, of 13, Rue Gaillon, Paris, in the empire of France, engineer, for "*Improvements in vapour or gas burners.*" A communication. Sept. 19, 1870.

INVENTION PROTECTED FOR SIX MONTHS ON THE DEPOSIT OF A COMPLETE SPECIFICATION.

2633.—GEORGE HASELTINE, of Southampton Buildings, London, for "*Improvements in combined lifting and force pumps.*" A communication. Oct. 4, 1870.

NOTICES TO PROCEED.

1455.—JOSEPH BREEDEN, of the firm of J. and W. Breeden and Booth, of Birmingham, in the co. of Warwick, manufacturers, for "*Improvements in lift and force pumps.*" May 19, 1870.

1456.—ALEXANDER MELVILLE CLARK, of 53, Chancery Lane, in the co. of Middlesex, patent agent, for "*Improvements in apparatus for the production of gases for lighting and heating purposes.*" A communication. May 19, 1870.
1472.—THOMAS HOLT LLOYD, of Stockport, in the co. of Chester, engineer, for "*Improvements in the construction and arrangement of valves for regulating the supply or discharge of steam, water, and other fluids.*" May 21, 1870.
1500.—WILLIAM EDWARD NEWTON, of 66, Chancery Lane, in the co. of Middlesex, civil engineer, for "*Improvements in earth-closets, applicable also in part to water-closets and privies.*" A communication. May 24, 1870.
1560.—WILLIAM CLELAND, of Linacre, near Liverpool, in the co. of Lancaster, manager of gas-works, for "*Improved means and apparatus for exhausting, forcing, and purifying gas for heating and illuminating purposes.*" May 28, 1870.
1713.—HENRY LAW, of 15, Essex Street, Strand, in the co. of Middlesex, civil engineer, for "*Improvements in apparatus for the supply of water to water-closets, urinals, lavatories, buildings, and streets, some of which improvements are applicable to other purposes.*" June 15, 1870.
1792.—EDWARD FINCH, of Beaufort Square, Chepstow, in the co. of Monmouth, for "*Improvements in machinery for forcing or exhausting air or aëriform fluids.*" June 23, 1870.
1813.—CHARLES WILLIAM SIEMENS, of 3, Great George Street, Westminster, in the co. of Middlesex, for "*Improvements in regenerative gas-furnaces and apparatus connected therewith for the manufacture of glass, also partly applicable to regenerative gas-furnaces generally.*" Partly communicated. July 25, 1870.
2229.—THOMAS PENN, of 40, Westbury Street, Wandsworth Road, Clapham, in the co. of Surrey, for "*An improved method of regulating the opening and closing of water-closet and other cocks by hydraulic pressure.*" Aug. 11, 1870.
2242.—WILLIAM OLIVER JOHNSTON, of the town and county of Newcastle-upon-Tyne, engineer, for "*Improvements in the production of cast-iron pipes, columns, and other similar castings.*" Aug. 12, 1870.
2331.—ALBERT MARCIUS SILBER, of Wood Street, Cheapside, in the City of London, merchant, for "*Improvements in apparatus for lighting and heating purposes.*" Aug. 24, 1870.
2338.—ALFRED VINCENT NEWTON, of 66, Chancery Lane, in the co. of Middlesex, mechanical draughtsman, for "*Improvements in liquid-meters.*" A communication. Aug. 25, 1870.
2398.—JOHN WARD GIRDLESTONE, of 37, Norfolk Street, Strand, in the co. of Middlesex, for "*Improvements in 'dry' closets, commodes, urinals, and other receptacles for putrescible matter.*" Sept. 2, 1870.
2460.—ALFRED TYLOR, of 2, Newgate Street, in the City of London, brass-founder, for "*Improvements in wet and dry closets, and in apparatus connected therewith.*" Sept. 12, 1870.

PATENTS WHICH HAVE BECOME VOID
BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

2414.—JAMES LEE NORTON and GEORGE HAWKSLEY, "*Improvements in apparatus and means for burning combustible liquids, vapours, and gases, to obtain light and heat therefrom.*" Aug. 22, 1867.
2422.—JOHN VARLEY, "*Improvements in apparatus for raising, supplying, and measuring water to steam-boilers, part of which invention is also applicable to measuring water for other purposes.*" Aug. 23, 1867.
2435.—WALTER CHRISTOPHER THURGAR, "*Improvements in apparatus for regulating the supply of gas to burners.*" Aug. 26, 1867.
2549.—FREDERICK TOLHAUSEN, "*An improved process and apparatus for instantaneously disinfecting fœcal and manuring matters, improving the same, and also rendering them fit for feeding domestic animals.*" Sept. 9, 1867.
2621.—ALEXANDER MELVILLE CLARK, "*Improvements in valve-closet apparatus, part of which is applicable for regulating the flow of water in other cases.*" Sept. 17, 1867.
2625.—THOMAS ADAMS and GEORGE JOHN PARSON, "*Improvements in and applicable to slide-valves.*" Sept. 18, 1867.
2643.—LOUIS LENZBERG, "*Improvements in gas-lamps and burners for the same.*" Sept. 20, 1867.
2665.—ANGUS MACKENZIE and SAMUEL ROBINSON, "*Improvements in apparatus to be applied to cisterns for preventing waste of water.*" Sept. 21, 1867.
2668.—ADAM AITCHISON and HENRY JOHN GRANTHAM, "*Improvements in the production of carburetted gas, and in the apparatus and burner applicable thereto.*" Sept. 21, 1867.
2688.—GEORGE BATCHELDOR, "*Improvements in trough water-closets.*" Sept. 24, 1867.

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Possess a simplicity of construction and facility for repair greater than any yet produced, while the excellence of the material and workmanship, and accuracy of registration, cannot be surpassed. The superiority of their Dry Meters in Tin Cases is also well known, having stood the test of years.
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WANTED, by a Man aged 43, a situation as MANAGER of a Gas-Work, where one or more stokers are kept. Understands indices of meters, setting retorts, laying mains, and the whole duties of a Manager. Good seven years reference.
Address O. P., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO GAS ENGINEERS.

WANTED, a gentleman with a thorough knowledge of GAS ENGINEERING. Must be a good draftsman, also capable of drawing up estimates and the construction of sun-lights, and the general routine of gas-fittings.
Apply by letter only, with full particulars, to D. C., care of Messrs. Street Brothers, 5, Serle Street, LINCOLN'S INN.

WANTED, by a married Man, aged 30, a situation as MANAGER of Gas-Works. Has had ten years practical experience in large works, and is thoroughly acquainted with the manufacture and distribution of gas, laying of mains, &c. Would not object to go abroad. First-class testimonials and references. Security if required.
Address L. A. S., Post-Office, EXETER.

TO GAS COMPANIES.

WANTED, by the Advertiser, a re-engagement in a country town as Working Manager and Fitter, and Meter Repairer. Eight years experience in the manufacture and distribution of gas.
For further particulars, apply to T. ELLIOTT, 92, Belgrave Road, BIRMINGHAM.

WORKING Manager Wanted, for small Gas-Works in the country. He must be capable of taking the entire charge of the works, and also the meters and services. Wages 17s. per week, with house, gas, fuel, and good garden ground.
State full particulars and age to Mr. THOMAS BARNETT, Secretary, Gas Company, Bloxham, Banbury, OXON.

BAHIA GAS COMPANY, LIMITED.

STOREKEEPER Wanted, to proceed to Bahia, Brazil. He must be thoroughly conversant with gas-fittings, and have filled a previous situation as Storekeeper or Store-clerk. Salary £180 per annum, with house-rent.
Address by letter, enclosing copies (only) of testimonials, to the Bahia Gas Company, Limited, 76, Coleman Street, LONDON., E. C., on or before Tuesday, the 18th of October inst. ALFRED J. HEAD, Secretary.
Oct. 4, 1870.

New edition, 5th thousand, price 6d.; by post, six stamps.

GAS ECONOMY. More Light on Gas, METERS, &c. By R. FERRIER, Royal Exchange, Edinburgh. "Most useful handbook." "Highly recommended."—*Mechanics' Magazine, Engineer, Journal of Gas Lighting, &c.*
Apply as above, HOULSTON & SONS, LONDON, and any Bookseller.

BAHIA GAS COMPANY, LIMITED.
NOTICE is hereby given that the ORDINARY HALF-YEARLY MEETING of the Company will be held at the London Tavern, Bishopsgate Street, London, on TUESDAY, the 25th day of October, 1870, to receive the Report of the Directors, the Balance-Sheet approved by the Auditors, and for general purposes.
And Notice is also hereby given that at the conclusion of the Ordinary Meeting, an Extraordinary Meeting will be held for the purpose of obtaining the sanction of the Shareholders to an increase of the capital of the Company to the extent of £5000.
The chair will be taken at Three o'clock precisely.
By order of the Board,
Oct. 8, 1870. ALFRED J. HEAD, Secretary.

TOTTENHAM & EDMONTON GAS-LIGHT and COKE COMPANY.
NOTICE is hereby given that the ANNUAL ORDINARY GENERAL MEETING will be held at the Works, Willoughby Lane, near Park Station, Tottenham, on WEDNESDAY, the 26th day of October inst., at Three o'clock in the afternoon precisely; to receive the Report of the Directors; to declare a Dividend to the 30th of June last; and for the Election of Two Directors and an Auditor for the ensuing year—J. Samuel, Esq., and A. A. Croll, Esq., being the Directors, and John Nicol, Esq., the Auditor, who retire by rotation, and are eligible for re-election, and offer themselves accordingly.
The accounts for the year ending the 30th of June, 1870, have been audited, and will be open to the inspection of Shareholders fourteen days prior to date of meeting.
The Transfer Books will be closed on Tuesday, the 11th, until the 29th inst.—By order of the Board,
JAMES RANDALL, Secretary.
Edmonton, Oct. 11, 1870.

EDGE'S Patent for Removing the CARBONACEOUS INCRUSTATION from GAS-RETORTS.
For particulars and terms, apply to E. GODDARD, Sole Agent, Gas-Works, IPSWICH.

TAR.

THE Directors of the Cambridge Uni-versity and Town Gaslight Company are open to receive OFFERS for their produce of TAR, particulars of which may be had from W. WOOD, Manager.

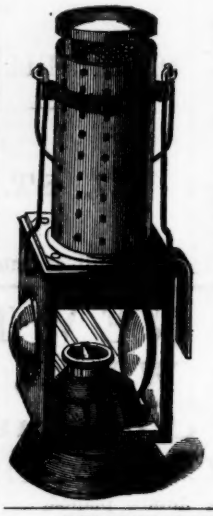
IMPORTANT TO GAS COMPANIES.

IN anticipation of the "Sales of Gas Act" coming into full operation, Messrs. BRADDOCK have prepared a LARGE STOCK of METERS, from Two Lights to Three Hundred Lights, which can be supplied on receipt of order.
Globe Meter-Works, OLDHAM.

CATHELS'S Patent Ribbed Gas Main-PIPES cost but about 1d. to 2d. per yard (depending on the size) more than Plain Pipes, and ensure PERFECT GAS-TIGHT CONNEXIONS with the Service-Pipes.
Apply to Messrs. BEGGS & SON, 37, Southampton Street, Strand, LONDON.

CATHELS'S Patent District Dry Gas-GOVERNOR is the only perfect self-acting contrivance for Regulating the Pressures in the higher levels of a district.
For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, ROTHERHAM.

CATHELS & TERRACE'S Patent Four-WAY DISC GAS-VALVE is the simplest and best Valve for Purifiers, and as a By-pass for other apparatus in Gas-Works. It is always gas-tight, and has no springs, ground faces, or other delicate parts. By its use the flow of the gas cannot be accidentally stopped, and it never sticks.
For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, Foundry and Brass Works, ROTHERHAM.



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KING'S CROSS.
Gas-Works for Mansions Erected.

BELGIAN CLAY RETORTS.

J. SUGG and CO., late ALBERT KELLER, GHENT.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.
Communications addressed to J. SUGG & CO., GHENT, will receive immediate attention.

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BRETTELL'S ESTATE
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WENLOCK IRON WHARF, 20 & 22, WHARF ROAD, CITY ROAD, LONDON, N.,
Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water Works, including Iron Retorts, Socket and Flange Pipes, Bends, Branches, and Syphons of all sizes, Lamp Columns, &c., &c.
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Upwards of 16 years Retort Setter to the Chartered Gas Company, Brick Lane and Curtain Road Stations.
Materials supplied on reasonable terms if required, or labour only.
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Same quality as supplied by us to several of the most extensive Gas Companies, and which has given entire satisfaction.
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Manufacturer of Clay Retorts, Fire-Bricks, and every description of Fire-Clay Goods.

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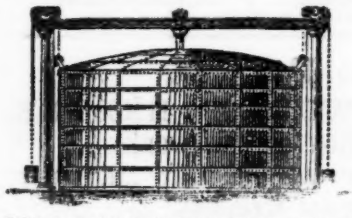
N.B.—*Export orders continue to have prompt attention.*



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SLUICE-VALVES, from 14s. per inch,

Tight on both Faces, and fitted with Gun-Metal Valve Faces and Seats, and Screws and Nuts.

Every Valve proved to 200 lbs. per square inch.

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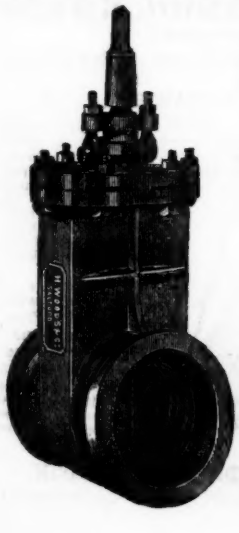

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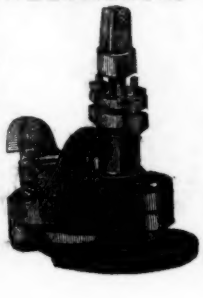

BRONNER'S PATENT GAS-BURNERS give 99 per cent. of light, as compared with 27 per cent. given by ordinary burners, with equal consumption of gas.—*Vide* "Gas Referees Report," published June, 1869.

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CANNEL COAL.—The West Yorkshire Iron and Coal Company, Limited, beg to draw the attention of Gas Companies to their Cannel, of which the following is the analysis made by W. Huggon, Esq., F.C.S.:

Yield of gas per ton	10,296 cubic feet.
Illuminating power rather over	21 sperm candles.
Yield of coke per ton . . .	12 cwt.

The actual working, as reported by one of the largest gas companies in Yorkshire, gives results still more favourable, viz.—

Yield of gas	10,416 cubic feet.
Illuminating power	21·89 sperm candles.
Coke	The same.

We add from the same source the capabilities of the common gas coal—

Yield of gas	10,080 cubic feet.
Illuminating power	14·41 sperm candles.
Yield of coke	13 cwt.

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One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

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Beg leave to call the attention of Gas Companies to the superior quality of their Cannel for gas-making purposes.

This Cannel produces in actual working, in iron retorts, 9200 cubic feet of 32-candle gas, and upwards of 11 cwt. of coke, and in clay retorts will produce 11,500 cubic feet of 25·9-candle gas.

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Can offer a CANNEL COAL yielding a large quantity of Gas of superior quality.

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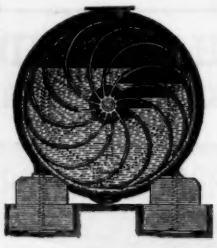

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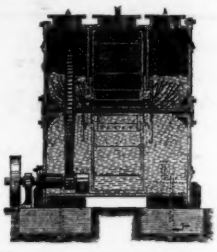

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Iron and Fire-Clay Retorts.
Annular and Pipe Condensers.
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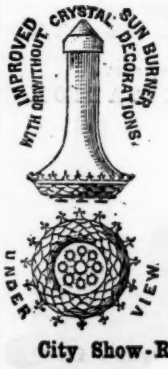

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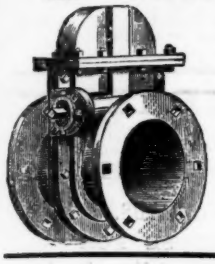

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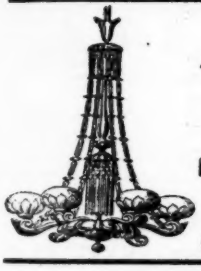

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FOUR-WAY VALVES, one of which is equal to three ordinary Valves.
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GASLIGHT PERFECTER.

Extract from Report by Dr. Letheby:—
"The results have been very remarkable, for they show an average increase of 63 per cent. on the illuminating power of the gas. I am of opinion, therefore, that the invention is of great practical value."
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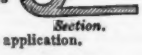

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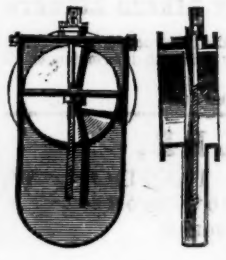

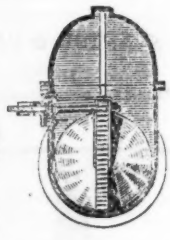

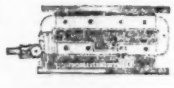

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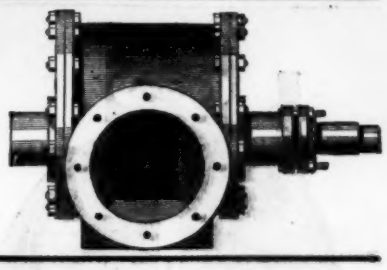

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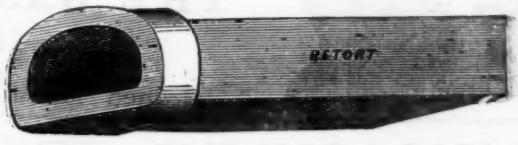

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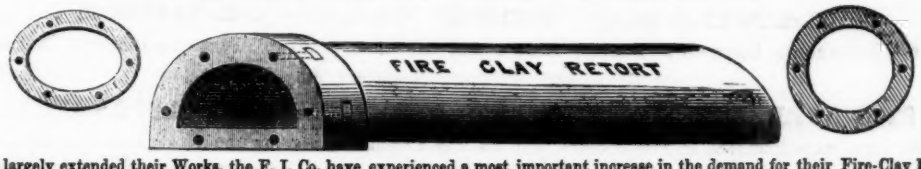

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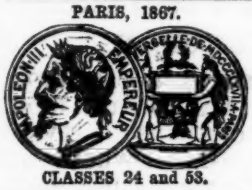

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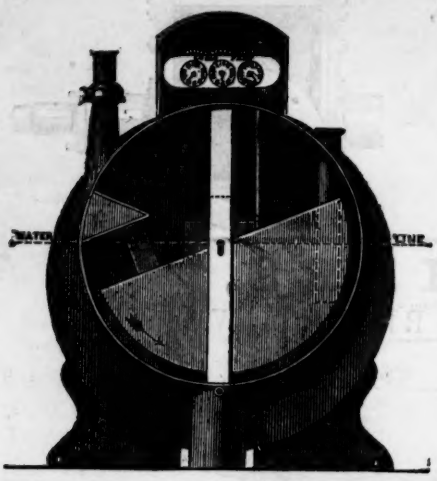

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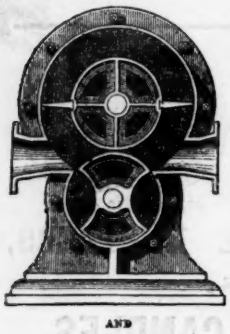

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